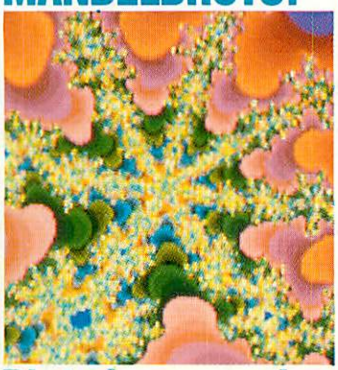
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MENU

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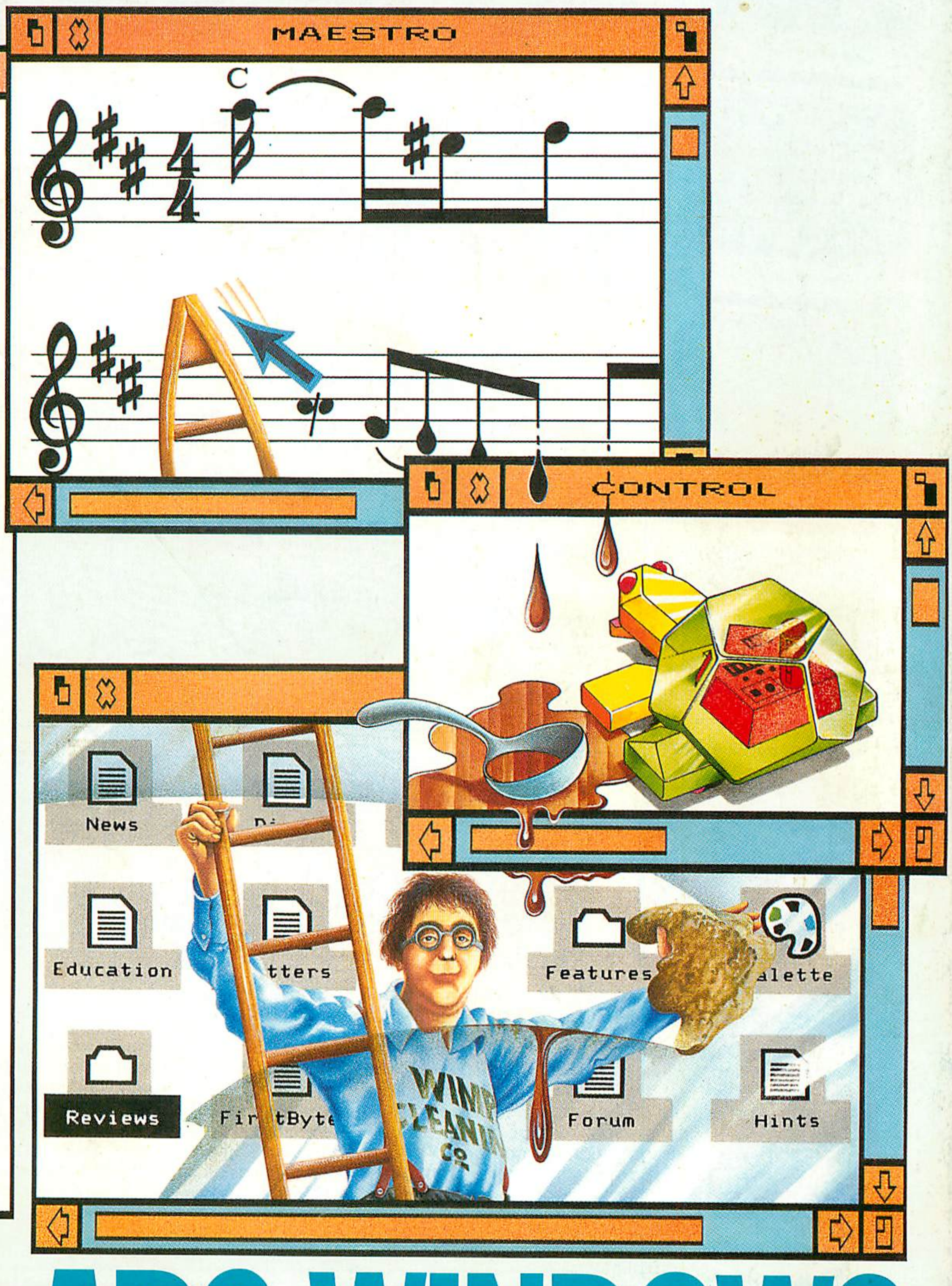
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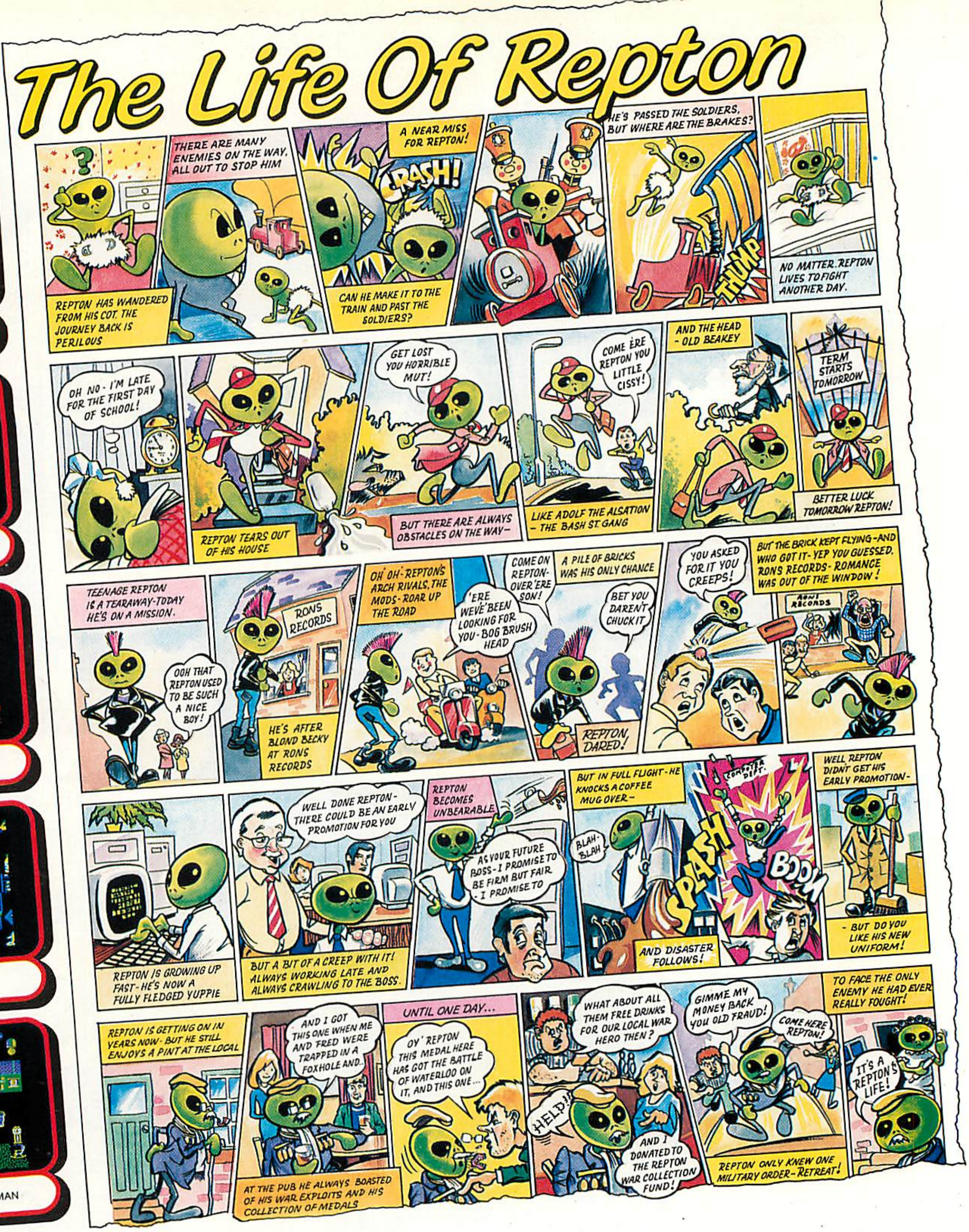
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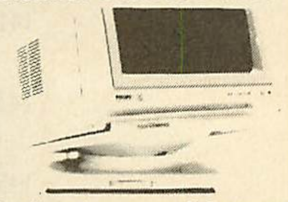
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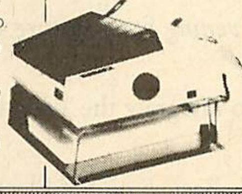
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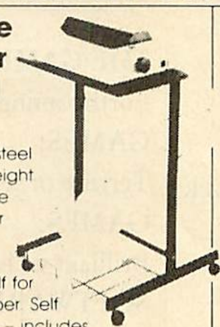
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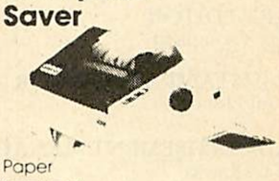
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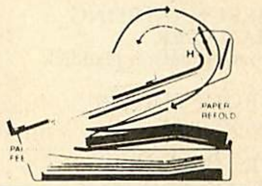
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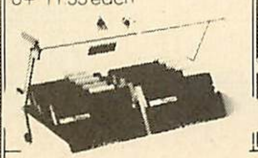
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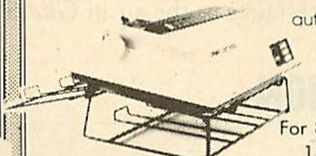
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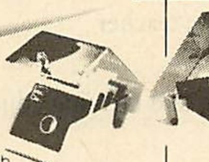


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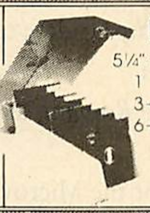
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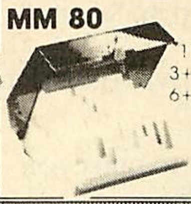
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ISSUE No 68 MARCH 1988

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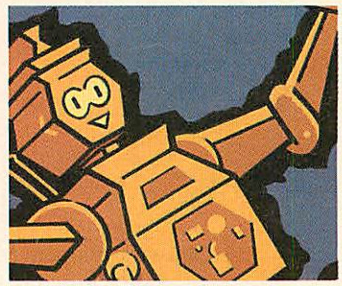
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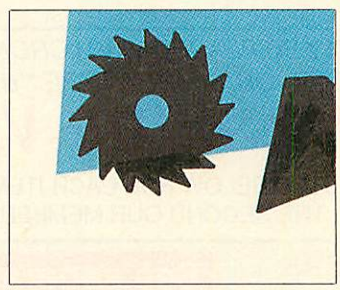
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CONTROL TRICKS/*Page 81*



Joe Telford investigates a new language to make control programming easier

BUILD YOUR OWN TOOLKIT ROM/*Page 87*



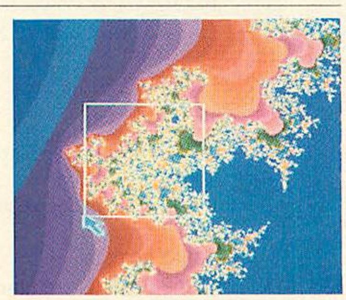
Keep your favourite utilities permanently on call with Dave Lawrence's *AutoROM* program

ARC WINDOWS WITHOUT PAIN/*Page 95*



Using the Arc's windowing system in your own programs is easier than you think!

MANDLEBROTS IN MOMENTS/*Page 103*



The fascinating fractals of the Mandlebrot set can be created in seconds on the Archimedes

PLEASE DO TOUCH/*Page 159*



Being able to just touch the screen rather than use the keyboard opens up the micro to many less-able children

COVER



Illustration by Richard Draper

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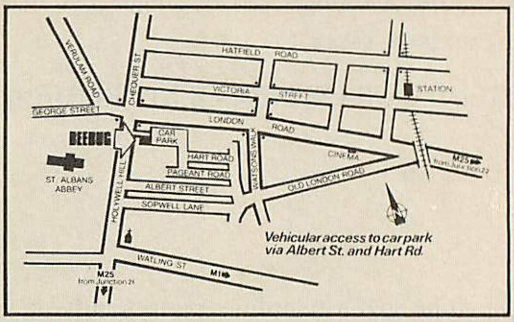
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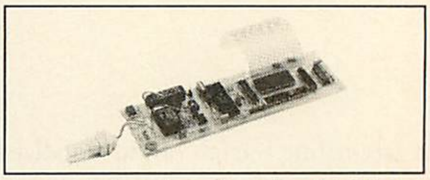
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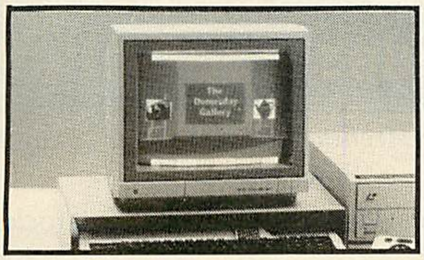
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NEWS

EDITORIAL

Written any letters on an Archimedes yet? If you have, well done. You've overcome the hurdles Acorn places in front of people attempting the most basic of micro tasks – wordprocessing.

'Prior to running *View*, load and run the 6502 emulator' say the instructions. But the separate guide to running the emulator fails to mention where the emulator can be found on the disc.

Yet it's perfectly possible to make this very easy. A *View* disc can easily be made to start from both the Desktop and via Shift-Break. Why did Acorn make things deliberately difficult? Acorn doesn't want to encourage people to use the emulator. But we've got to – six months after the launch, there still isn't a wordprocessor that runs *without* it.

View should have been included on the Welcome disc. Acorn might claim this would harm development and sales of more advanced wordprocessors – what, a four-year-old eight-bit program that runs slower than on a model B!?

If *View* had been on the Welcome disc, would *First Word Plus*, *ArcWord* or *Graphic Writer* have been any later? Their sales could only be hurt if they weren't much better than the freebie – as they surely must be.

As it is, the Arc is sold without the most fundamental tool of all. Not quite a tractor without the plough, but not far from it. Acorn can't afford to continue selling advanced hardware yet ignoring what its customers want to do with it.

Graham Bell

School micro units to merge

By Bill Penfold

The long-established Council for Educational Technology (CET) is to be merged with the Microelectronics Education Support Unit (MESU) by April. MESU took over from the Microelectronics Education Programme (MEP) just two years ago. The new body will be called the National Council for Education Technology and is likely to be based in Coventry.

MICROELECTRONICS EDUCATION SUPPORT UNIT

Education Secretary Kenneth Baker claims economy of scale will 'enhance' the work being carried out by both bodies.

The CET has been around for many years as a 'think tank' and evaluator of technology, and still holds the copyright of many of the MEP projects. MESU took over part of the role of the MEP, the body which supported the project to put a micro – most of them BBCs – into every school.

The new body will have a broad remit to evaluate technology for education and training, and publish its findings.

It will also be expected to provide an information service to schools. A further role will be to support trainers and advisory teachers and to provide help to teachers using IT across the curriculum.

In addition, Mr Baker wants the new body to continue to develop MEP work on special education. Such changes, he maintains, will achieve 'greater overall effectiveness, and, in the process, better value for money.'

However, almost any reference to finance is bound to provoke fears that the Government is aiming to trim budgets on the grounds that amalgamation will end wasteful duplication of services and facilities.

With Government grants of just £800,000 and 36 staff, the CET claims to already be highly cost-effective and officials are quick to point out that it is larely self-funding through outside contracts. Meanwhile the MESU – with a £3.1m budget – is only two years into its planned five-year life.

Chips designed on Arc

Qudos is using the Archimedes to design custom silicon chips quickly and cheaply. It plans to launch its *Quickchip* chip design software – presently running on powerful Unix workstations – on the machine.

Qudos' chip making process means students can design their own chips, then have them built for £300 per design.

Peter O'Keeffe, managing director of Qudos, hopes this will increase sales of the machine into higher education, where science and engineering students study chip design as part of their courses. 'We had hoped to put out an Archimedes version of *Quickchip* much sooner. It would have helped if the 400 series had been available when the machine was first launched, and if there had been more help from Acorn for software developers.'

■ As well as being chip designers and builders, Qudos are a leading Acorn distributor.

'We can't get enough of the 400 series to satisfy demand' said O'Keeffe. 'Acorn seems to have made too many of the 305 when the demand is for the one megabyte and over versions.'

Micro guides from Watford

Watford Electronics is publishing two books about BBC and Acorn computers. One is the long-awaited *Master Reference Guide*, originally commissioned by Acorn. It appears after two years of uncertainty. Watford's own authors have updated the manual.

The other is the *Complete BBC Computer User's Handbook*, covering the B, B+, Master and Compact, as well as the Electron. Some chapters are machine-specific, but the book is intended to show users how to get the best out of the whole range. It costs £14.95.

Clares' Arc applications

Clares Micro Supplies is boosting the amount of Archimedes software available by releasing three programs at once.

The first is a utilities disc for *Artisan*. It includes a printer dump for Integrex and Epson colour printers, and facilities to merge one picture into another. 'There are eight merge patterns or you can define your own. The utility can mix one picture with another like a pop video – it's TV quality' said Dave Clare. It will cost under £20.

The two other programs are *Graphic Writer*, a £29.95 word-processor with graphics editor, and *Alphabase*, a database. *Graphic Writer* requires Arthur 1.2 or higher. Users should register for upgrades, which will be provided free.

Alphabase complements the existing BBC database *Betabase*. The program is geared to users who want a pre-packaged database without programming facilities. Files and information can be transferred from *Betabase* to *Alphabase*, which costs £49.95.

News in brief

■ Pineapple Software has upgraded its printed circuit board designer, adding an auto-routing facility to the program. It works on all the BBC micros including a standard model B. The ROM costs £55 for existing *PCB* owners; others will have to pay £212.75. A plotter driver costs £40.25.

■ The University of Keele's education department has released fast Archimedes versions of its mathematical programs. The programs are *Matpack*, for matrix manipulation, *EMAS*, which accompanies the textbook *Elementary Mathematics from an Algorithmic Standpoint*, and *NT* which deals with number theory.

Domesday discs go down on the farm

The BBC is continuing to back the Domesday system, despite poor sales and the internal turmoil at Acorn. Two new discs, *Volcanoes* and *Countryside*, will be released in 1988.

In an attempt to boost sales, the voucher scheme, which gives schools £1300 off the full price, is being extended until the end of March. This is the end of most schools' financial year when any surplus funds have to be spent or lost.

The recent restructuring of Acorn has taken staff from the Domesday project. Acorn spokesman Michael Page admitted that this was because of a shortfall in sales. 'It isn't that customers are dissatisfied. There simply aren't enough.'

The system is not short of critical acclaim for its unique system of storing pictures and computer data on a video disc, removing the need for controlling software to be run on a floppy disc. The *Ecodisc* won a gold award at the industry conference, Interactive '87. *Volcanoes* will be released this month. It was produced jointly by the BBC and the Oxford University Press. It features film of eruptions in Iceland and Hawaii, and animated film of explosions on one of planet Jupiter's moons, Io, the most volcanically active body known to man.



The BBC's *Countryside* disc simulates a working farm

The disc also includes the text of book by NASA researcher Dr Peter Francis, a glossary and a dictionary of relevant geological terms. These are linked by a sophisticated new indexing and cross-referencing system.

Pointing to a highlighted word produces an *Oxford English Dictionary* definition of it on screen. The BBC admits this is a very basic use of the concept, but will decide whether to incorporate a more complex version in the later releases.

The second release, scheduled for the autumn, is *Countryside*. It is a comprehensive picture of the state of the countryside. There are three main sections: a 'massive' database includes information on subjects ranging from soil surveys to rural industry, real-life case studies illuminate some of the problems facing the countryside, and, the centre-piece, a full-scale simulation of a traditional English mixed farm.

No prices have yet been decided for either disc.

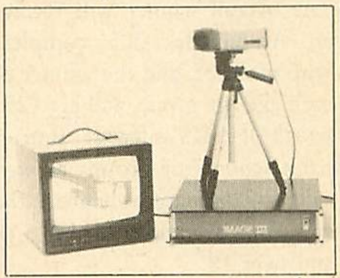
High hopes for British adventure company

Topologika Software hopes to become the British equivalent of American adventure publishers, Infocom.

Manager Brian Kerslake envisages the company releasing a stream of adventures for machines including the BBC and Archimedes, although he is reluctant to give release dates. Available at the moment are expanded disc versions of Acornsoft's *Philosopher's Quest* and *Countdown to Doom*.

A sequel to *Countdown to Doom*, by Peter Killworth, should be released soon. All the adventures cost £9.95.

Cheaper images



Eltime has cut the price of its Image III picture processor to £1495 with the software costing an additional £250.

Acorn wins Japanese ministry contract

Acorn has achieved the hi-tech equivalent of sending coals to Newcastle, selling computers into the technology-conscious Japanese market.

In a deal worth £40,000 the company has sold 40 Master 128s, installed as an Econet network, and a Domesday system to the Japanese Ministry of Foreign Affairs. It will be used to teach English to trainee diplomats at the ministry's Foreign Service Training Institute.

Acorn won the contract after submitting a tender which beat many US companies including IBM. Acorn's David Parker explained: 'The Japanese had seen a similar Acorn system in the British Council office in Japan. They were impressed by it and asked Acorn to tender. It was a very prestigious contract for us to win'.

Even further afield, the Western Australia Education Department has approved the Archimedes and Master Compact for use in its schools.

Both will be distributed by Barson Computers. A feature of the Compacts sent there will be the free software, including *View* version 3.0, *ViewSheet* and Logotron Logo.

Magazine guide to desktop publishing

January's *Educational Computing* carries a five-page article on publishing, including a colour poster. The article describes the experience of teacher Dorian Goring, one of whose tabloid pages is shown right. Copies cost £1.50 from Redwood Publishing.


PRESS

bransholme high school LIBRARY newspaper

october nineteen eighty seven

summer is over so wake up to some hard work in your lessons

NEWS UPDATE

smash hits —the most popular music mag— is available in the library

wanted

reporters to work on this paper ● here's what you have to do

did you know that more girls than boys watch tv soaps?

KIDS INVADE LIBRARY

by our own correspondent

some of the new pupils have quickly discovered where the library is and are making regular use of it at break and lunch times. good work

does photography or computer graphics interest you? seen the school photo exhibition?

more more more

Last call for DTP contest with Arc as prize

The *Acorn User* Great Paper Contest closes on February 29. The overall winner will receive an Archimedes 305 complete with monitor, and the winner of each age age group will get £250 worth of AMS software. Entries from schools or groups as well as individuals are welcomed; the categories are under 14, 14 to 18 and over 18.

The idea of the competition is to produce a new national newspaper. Entries should consist of three items: a two-page synopsis of the target readership, a list of typical issue contents and two complete A3 (tabloid size) pages from the newspaper.

Entries must include the name and age of all entrants, address and day-time telephone number. Send them to *Acorn User* at 20-26 Brunswick Place, London N1 6DJ. The competition will be judged in March by a team including Tony Quinn, Nick Pearson, MD of AMS, and a journalist from the national press.

THE COMMS COLUMN

■ The latest in Archimedes comms is a program, available now, which works with viewdata and scrolling systems. Even better is that the program has been placed in the public domain by the authors, Hugo Fiennes and Brian Clark, and can be downloaded from a number of bulletin boards, including this month's highlighted board, The Firm. The program offers auto-dialling and log on, and even XMODEM file transfer. Of course, if you've sold your Beeb to get an Arc, then I'm not sure how you'll log on to download it! Hugo Fiennes can be contacted on Prestel mailbox *234784531#.

■ Micronet's latest offer for prospective customers a Propak modem and software, together with a year's subscription to Micronet and Telecom Gold for £218.95.

The modem is a badged version of the Pace Linnet, an excellent low-cost intelligent modem, and the comms software is PMS' easy-to-use *Dialup*.

Together with the subscription the total value is about £300 (although £90 of that is the *Dialup* software which costs about three times as much as most of the competition!). The subscription offer doesn't, of course, include Prestel and Gold time charges, the latter being quite high, but nevertheless, if you were thinking of joining the comms world anyway, it looks like a reasonable offer.

■ The Microlink user group on Telecom Gold has started a 'play-by-mailbox' version of Diplomacy, the international strategy game. For those new to the game, a playing board can be obtained at a special price through Microlink. Ken Hughes, the moderator of the game, said they have about 25 players at the moment, but more are welcome, especially experienced Diplomacy players to act as adjudicators. Contact Ken on 72:MAG043.

■ The spotlighted board this month is The Firm, or Seahaven BBS, run as part of Seahaven Computer Club in Sussex. The board runs on SBBS software with a BBC, 10Mb Winchester and Demon modem. The board works in mode 7 colour and graphics, with a lovely flashing lighthouse on the front menu.

Features are diverse, from astronomy, through recipes (menu-driven of course) to quizzes, and a new Archimedes section, available to registered users only. It contains many hints and tips. Downloadable BBC telesoftware includes Music 500/5000 files, and some of the telesoftware that used to be featured on Prestel's Tubelink prior to the demise of Viewfax 258. This ex-Tubelink range includes the Lancanster University 65C02 assembler, and the Fanfare *Telecoms* program.

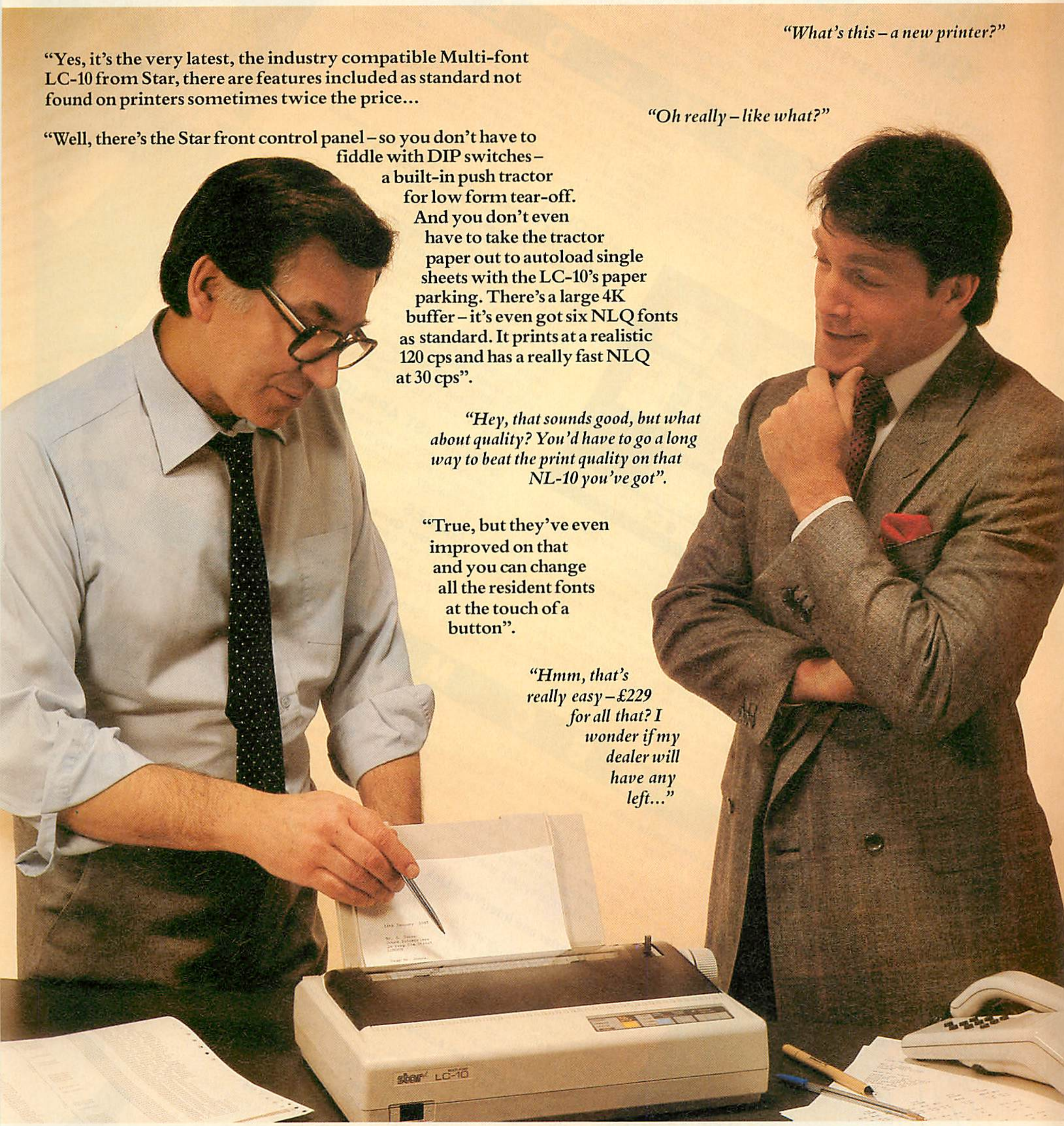
The board is run by Alan Baker, who used to edit the Ramlink and Musiclink sections on Viewfax, and much of the material which has been missed by Micronetters from those days can be found on this board.

The Firm runs for 24 hours a day, V21 or V23, 8N1 on (0273) 513872. To get the mode 7 colour display, you must be in mode 7 with the filter off.

David Atherton

Contact David Atherton at Acorn User *on 81:RED001, or direct through Prestel 942876210 and Telecom Gold 72: MAG11596.*

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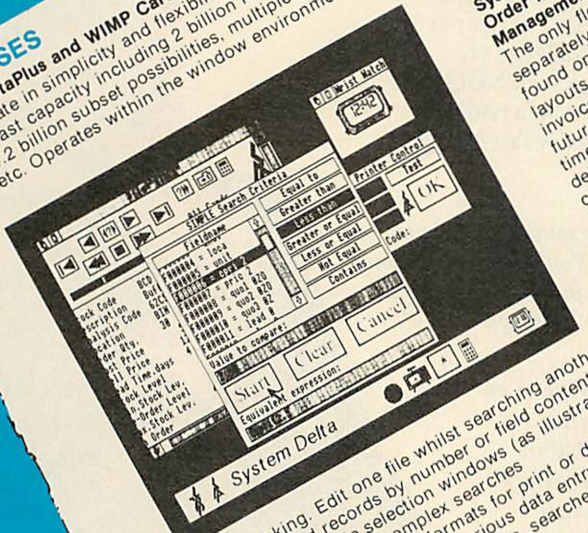
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White water micros

Enthusiasts are taking their BBCs into strange and dangerous places. Britain's wild water canoeists are using the micro to provide a timing and results service for their meetings.

The micros are, however, kept a safe distance from the river's edge. 'They are usually safe in the back of someone's car, running off a generator or car battery', explained technical director John Handyside.

Each canoe crossing the finish line breaks a light beam which signals the micro to calculate the time and position. The result is displayed on a series of monitors. Up to 2000 entrants can be recorded, although 200 is a more usual number for the canoeists.

'We wanted something a little more upmarket than pieces of string and stopwatches to time races. Two of my friends were BBC fanatics and working on timing programs; I introduced them, and together they produced two chips which contain the program,' said John Handyside.

The system includes information on each competitor which can be shown along with the race results. Programmers Mike Gettleson and Adrian Kennard have formed a company, Microtime, to market the program. It has already been used to time one stage of the RAC Rally.

■ A similar piece of software, to keep track of a cycle race, is described on page 163.

Compact and Arc discs

Compact and Archimedes owners no longer have to sit in sullen silence, missing out on all those wonderful programs and graphics.

Due to popular demand, *Acorn User* is now making the monthly listings disc available in the 3.5-inch format.

Both this month's and February's listings discs are now for sale in the new format.



Compact discs: listings on 3.5-inch

The listings cost only £7.95 on 3.5-inch disc. Cheques should be made out to Redwood Publishing and orders sent to *Acorn User* Monthly Disc Offer, 20-26 Brunswick Place, London N1 6DJ.

We can also transfer the contents of unprotected DFS or ADFS 5.25-inch discs on to 3.5-inch ADFS discs. The cost is £5 including the disc, or just £3 if you send us a blank formatted 3.5-inch disc.

It is the readers' responsibility to ensure that they do not breach copyright or the data protection laws.

Please include sturdy return packaging for both discs, plus postage, and ensure that all discs are clearly labelled with your name and address and the disc format you use.

Send your orders to the address above. *Acorn User* cannot accept responsibility for loss or damage. Be sure to keep a back-up copy of each disc you send.

Predictype finishes your...

If you want to know what you're going to type before you type it, then *Predictype* is the software for you.

The program gives five predictions from its 1500-word dictionary to chose from and is compatible with six of the most popular wordprocessors. Disabled people and inexpert typists are seen as the main users.

Predictype works on any BBC machine with at least 16k of sideways RAM and costs £30 (this includes a site licence for schools).



From little acorns

As half the country leaps around planting new trees, Dartington has leapt in to take over control of the Acorn Vase (as featured in last March's Abuser) from Wedgwood. It's a lead crystal vase about two inches high, used for starting acorns off on the way to being mighty oaks.

For news of next month's competition and co-operation with Micronet and the British Trust for Conservation Volunteers, turn to page 109.

Acorn confirms Unix workstation plans

Acorn has confirmed its Unix workstation is set for launch in the second half of this year. The machine will use an improved version of Acorn's RISC chip to run a version of Unix, the powerful multi-user operating system.

New MD Harvey Coleman outlined his hopes that Acorn would be able to expand from its traditional base in education into markets now dominated by Sun and Apollo. Spokesman Michael Page refused to give any details, saying: 'We are still some months away from launch and settling on the final configuration, which will depend on market needs.'

Whatever the configuration of the finished machine it will face competition from Atari, whose Abaq transputer-based Unix workstation is also scheduled for later 1988. Prototypes have been shown at computer trade fairs in the US, and details of its specifications released to journalists.

Education shows

Education exhibitions on the way include:

March 1-3: Education Equipment Exhibition; G-Mex, Manchester. MGB Exhibitions, 30 Calderwood St, London SE18 6HQ.

March 25: MAPE; the primary teachers' user group gets together at Durham University. David Whitehead, Holly Farm, Lench Rd, Waterfoot, Rossendale, Lancs.

July 5,7: Education, Training and Personnel Development; at the NEC Birmingham. Brintex, 178 Great Portland St, London W1N 6NH.

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Competition winners

The answer to November's *The Hunt* competition was that Phillip had an Electron, and Gary bought an Arc which comes with a mouse. Sarah bought a Trackerball for her Master 128 and Nigel has a Compact and joystick. David had the BBC B and a lightpen.

The winners were D Hullah of Harrogate, Geraghty and J Burnett of London, S Underwood from Par, K D Williamson from Norwich, M Bell from London, Mackie from Stoke Poges, K Bastemeijer from Holland, J Comber of Torquay and C Garnett from Kings Lynn.

Contacts

BBC Enterprises, Woodlands, 80 Wood Lane, London W12 0TT. Tel: 01-576 0202.
Clares Micro Supplies, 98 Middlewich Road, Rudheath, Northwich, Cheshire.
Dataphone Ltd, 22 Africa Square, Woodston, Peterborough. Tel: (0733) 230240.
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Pineapple Software, 39 Brownlea Gardens, Seven Kings, Ilford. Tel: 01-599 1476.
Qudos, Cambridge Science Park, Milton Road, Cambridge. Tel: (0223) 862333.
Topologika, PO Box 39, Stilton, Peterborough PE7 3RL. Tel: (0733) 244682.
University of Keele Education Department, Keele, Staffordshire ST5 5BG.

Coming next month in Acorn User



Next issue: software for the Concept Keyboard

April's *Acorn User* sees the start of a new regular feature written by Bruce Smith – a simple guide to using a spreadsheet. Bruce will take you through setting up a simple spreadsheet from scratch, with detailed descriptions and diagrams at each step of the way.

Joe Telford presents a program to help you design stained glass windows – either church windows or those you get above the doors in suburban houses – and there's also a way to print them out in colour using an Integrex Colourjet printer.

If you don't have a colour printer, Dorian Goring shows you how you can produce coloured hard copy using your ordinary dot-matrix printer.

Hints and Tips shows you how to keep a mailing list in *View*. Sending out a standard letter to a list of people can be done using 'macros', and there's also a program to print address labels from *View* macro files. And Martin Phillips has written a routine to make April Fool's Day a real event.

Chris Drage and Nick Evans continue their look at hardware and software for special needs education, looking this month at the Concept Keyboard and Elfin speech systems.

Plus there are reviews of *Black Queen*, BBC Soft's Bridge program, and BBC Basic on the Apple Macintosh.

BLUNDERBOX

In the February issue, the *Repton* graphics loader on the Games Page should read:

```
160 $&900="SAVE "+LE
FT$(a$,6)+"1 5800 +262
0 0 31E0"
```

And on page 97, also in February, the first key definition should read:

```
*KEY 0 "*FX 7,7|M*FX
8,7|M*FX3,7|MLIST|MPRI
NT|"*FX 2,0|"|M*FX 3,0
|M"
```

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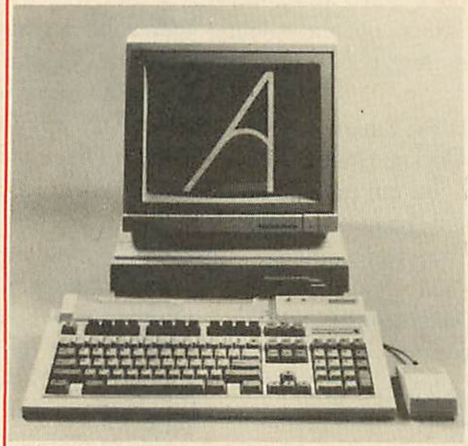
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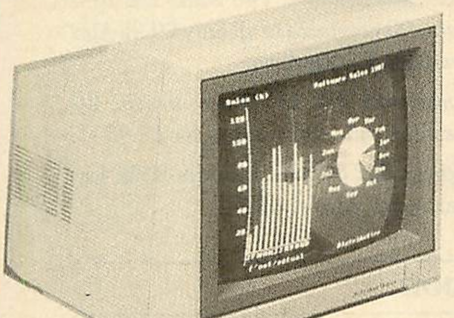
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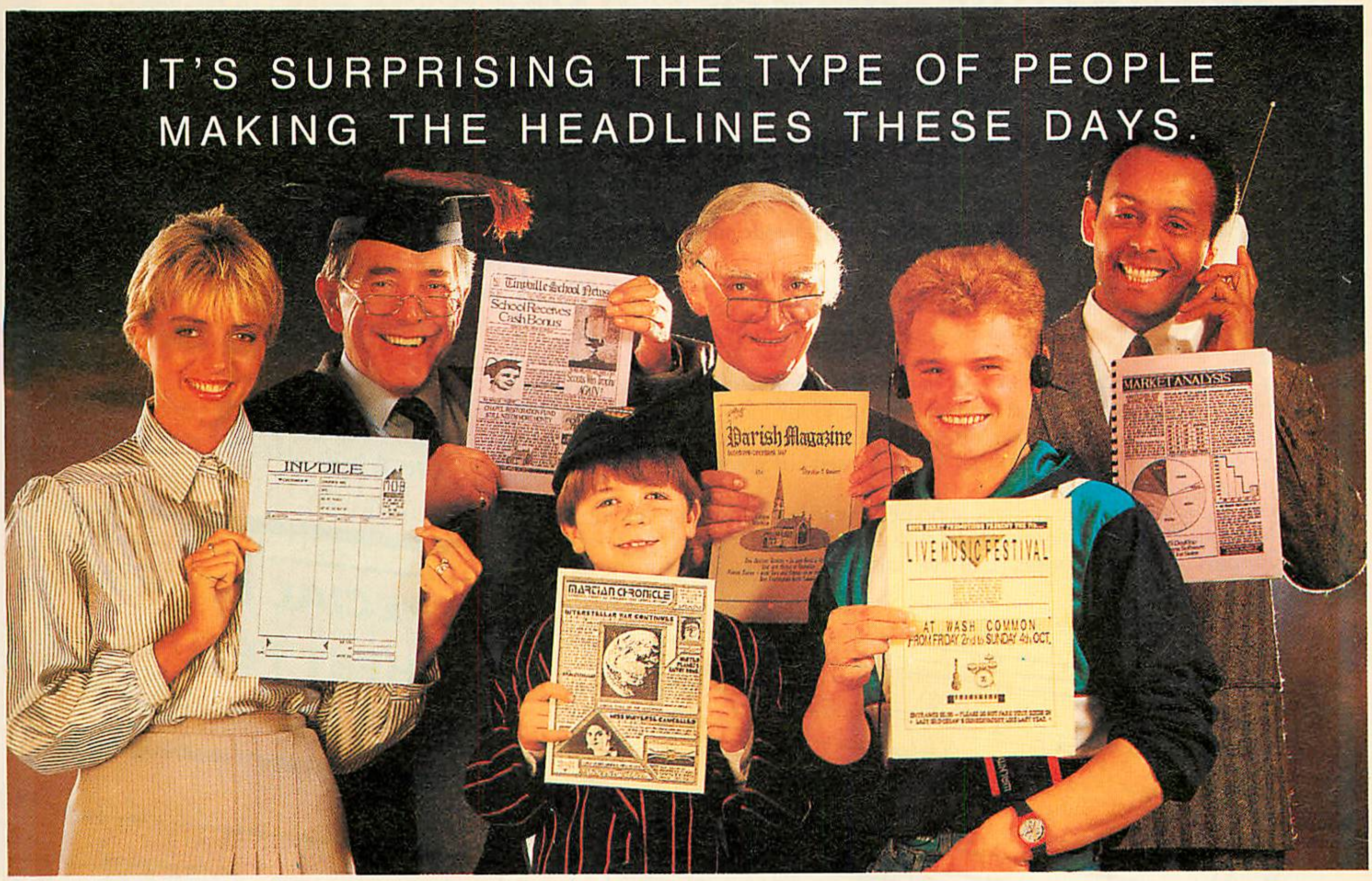
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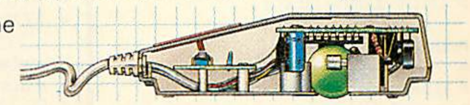
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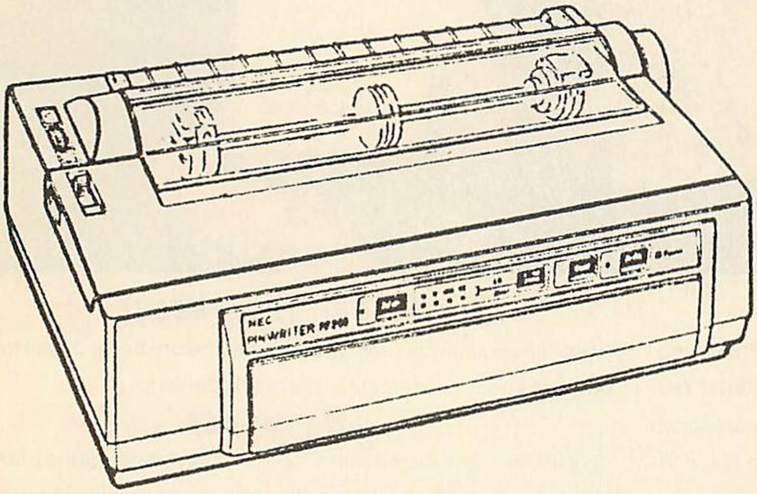
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FREE 200 SHEETS PAPER
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SPECIFICATIONS

Print Rate
- High-speed draft: 168 cps
- Standard draft: 140cps
- Letter quality: 56 cps

Printhead
- Impact, 24-pin dot matrix
- 0.2mm diameter
- 2 x 12 staggered array

Vertical Line Spacing
- 6 or 8 lines per inch (lpi)
- Programmable up to n/360 lpi

Resident Type Fonts and Variations
- Draft Gothic: 10, 12, 15, 17, and 20 pitches
- LQ Courier: 10, 12, 15, 17, and 20 pitches
- LQ Bold Proportional Spacing: plus condensed
- LQ Super Focus: 10 and 17 pitches
- LQ OCR-B: 10 and 17 pitches
- LQ ITC Souvenir: 10 and 17 pitches
- Italicization, emphasis, and enhancement electronically possible for all the above
- True superscript/subscript

Character sets
- ASCII standard
- IBM graphic
- Italic
- 96 user-defined characters
- 13 language character sets

Interface
- Industry-standard parallel
- RS-232C (optional)

Input Buffer
- 8K standard

Graphic Resolution
- Up to 360 x 360 dpi

Copy Printing Capacity
- Original and two copies with copy control lever

Paper Width/Weight
- 5 top 10 inches/12 to 22 lbs.
- 6.5 to 8.5 inches with sheet feeder

Dimensions (W x H x D)
- 390mm(15.4"x140mm(5.5")x280mm (11.0")

OPTIONS AND SUPPLIES

Paper Handling Devicer
- Sheet Feeder

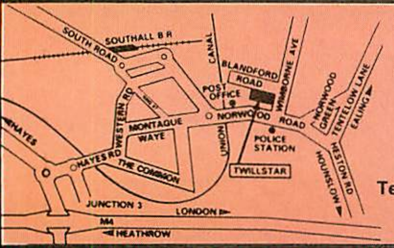
Interface Board
- Serial Interface Board

Font Cartridges
- Letter Gothic 15
- Letter Gothic 12
- Bold Italic PS
- Courier 15
- Prestige Elite 12
- Prestige Pica 10
- Courier Light 10
- Courier Light 12
- OCR-A
- Prestige Elite 12 WP
- OCR-A/Bar Code 39
- Helvette 10 PT.

Ribbon
- Black Fabric

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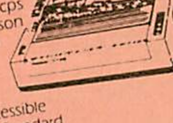
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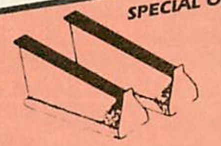
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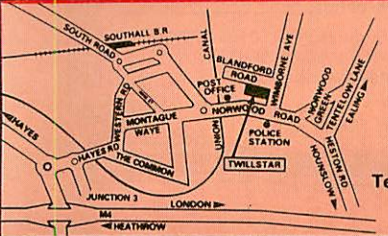


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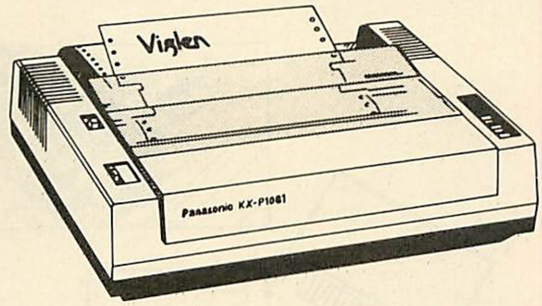
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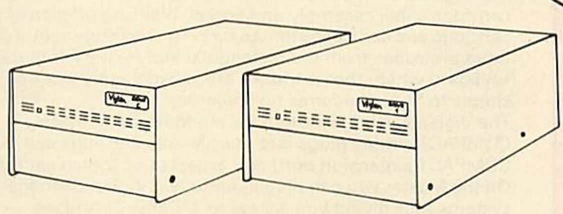
Stock Code	Description	Price inc. VAT
SP079	Panasonic KX-P1081 plus accessories	£185.95

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WINCHESTER

MEGA BYTES FOR MINI BUCKS

NEW LOW PRICES



Plug in 20 to 112 Megabytes of extra storage with the Viglen Winchester system.
The Viglen Winchester is ready to plug in and use on a BBC Master micro; for a BBC B or B plus you will merely need to fit the Acorn ADFS Rom. The Winchesters are 100% compatible with the Acorn Winchester and Acorn ADFS and will also work with the Acorn Master 512 board with DOS plus.
Drive 1 Winchesters are also available for backup or just more storage and simply plug into the back of the Drive 0 unit.
The Winchester package consists of: Winchester unit (cased with controller boards, power supply and fan), Master reference Manual part 1, Winchester user guide and Winchester utilities on disk (such as formatter, verifier, ADFS menu and sophisticated backup program allowing you to make fast backups on DFS disks, ADFS disks or Drive 1 Winchester).

Stock Code	Description	Price inc. VAT
Drive 0 Single		
SP0150	VB20 20Meg Viglen Winchester	£499.00
SP0152	VB28 28Meg Viglen Winchester	£519.00
V155	VB40 40Meg Viglen Winchester	£799.00
V156	VB56 56Meg Viglen Winchester	£899.00
Drive 1 Second Drive		
SP0160	VB120 20Meg Drive 1 Winchester	£479.00
SP0162	VB128 28Meg Drive 1 Winchester	£499.00
V165	VB140 40Meg Drive 1 Winchester	£739.00
V167	VB156 56Meg Drive 1 Winchester	£769.00
V157	20MB Tape Streamer Backup	£689.00
V503	Acorn ADFS Rom and Manual (Only necessary for BBC B or B Plus)	£29.95

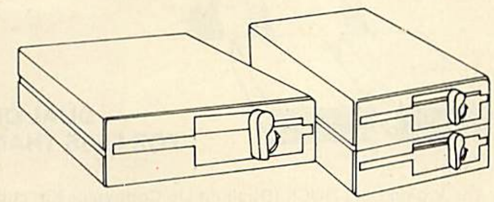
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Available for use with SJ research file server at no extra cost, please specify when ordering.

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FROM £99.95 inc. VAT

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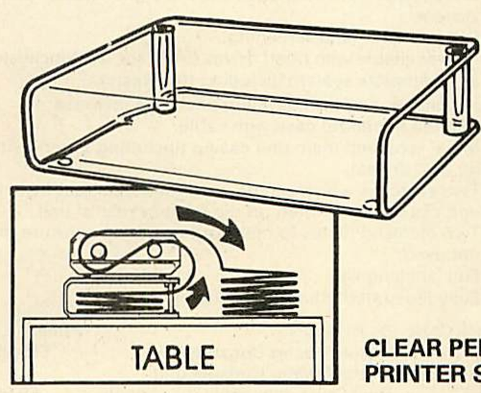


All disc drives are supplied with a manual, packed utilities disc and a full 12 Months warranty (2 Year Warranty available) and are ready to plug in and use on a BBc B (fitted with a DFS) B + or Master micro. 40/48 Track drives have a switch which enables operation in either 40 or 80 track mode.
The capacity quoted are given in single density mode; for double density mode (1770 DFS + ADFS as in the Master) the capacities should be approximately doubled.
An integral power supply is not necessary as the disc drives run from the micro's power source however should you require drives with their own power supply, these are also available.
If your BBC B micro does not have a DFS fitted then you will also require the Acorn dfs kit. These are available from Viglen.

Stock Code	Description	Price inc. VAT
SP014	400K Single Drive 40/80T	£99.95
SP030	400K Single Drive 40/80T + PSU	£109.95
SP019	800K Dual Drive 40/80T	£189.95
SP020	800K Dual Drive 40/80T + PSU	£209.95
VPD0240	100K Single Drive	£105.95
VPD0241	400K Single Drive 40/80T	£113.00
VPD0242	200K Dual Drive	£195.95
VPD0243	800K Dual Drive 40/80T	£219.00
VPD0245	100K Single Drive + PSU	£119.95
VPD0246	400K Single Drive + PSU	£135.00
VPD0247	200K Dual Drive + PSU	£209.95
VPD0248	800K Dual Drive 40/80T + PSU	£235.00
VPD0249	800K Dual Drive 40/80T + PSU in Metal Bridge Unit	£265.00
V0060	3.5" 400K Single Drive	£95.95
V0061	3.5" 800K Dual Drive	£199.95
V0062	3.5" 400K Single Drive + PSU	£135.00
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V0064	3.5" and 5.25" 800K Dual Drive	£219.00
V0065	3.5" and 5.25" 800K Dual Drive with PSU	£249.00

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The Viglen printer stands are beautifully finished in clear perspex and raise the printer high enough to put continuous stationary underneath.

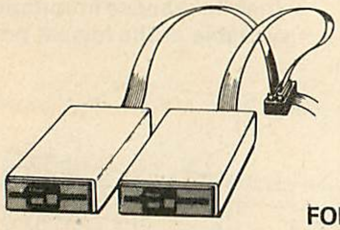
Stock Code	Description	Price inc. VAT
V490	80 Column Printer Stand (15" × 13" × 3.5")	£19.95
V491	136 Column Printer Stand (23.5" × 13" × 3.5")	£29.95

Please add £3 P & P

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DUCKS



DUAL DRIVES FOR LESS THAN £17!

The Viglen Data DUCK (Dualling Up Connector Kit) converts any two single drives to a dual drive instantly. Simply plug the duck into the micro's disk drive socket and plug two single drives (any type and any make) into the duck to obtain a dual drive system accessed as drive 0 (and 2 if double sided) and drive 1 (and 3 if double sided). If neither single drive has its own power supply then you will require a Viglen power DUCK in order to obtain two disk drive power sockets from the micro.

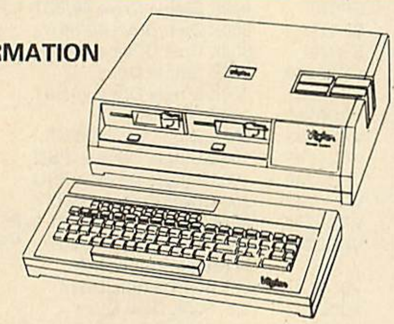
★ No soldering simply plugs in.
★ No need to take disk drives apart to change links.

Stock Code	Description	Price inc. VAT
V084	Viglen data duck	£16.95
V085	Viglen power duck	£7.95

Please add £2.50 for P & P.

CONSOLE SYSTEM

MASTER TRANSFORMATION



Give your BBC Master micro the professional PC look by replacing your existing lid with this smartly styled package. The system is strong and constructed in high impact ABS colour matched to the BBC Master and it gives your Master a very neat and impressive look.

★ Will support monitors including up to 16″ TV.
★ Can house two 5¼″ disk or Winchester drives.
★ Capable of housing 3½″ drives.
★ Will accept Acorn cartridges and the Viglen Master Cartridge system.
★ Full internal metal screening.
★ Also available with fitted drives (5¼″, 3½″ or Winchester) or as a complete system including the Master.

The Master console unit system packages includes:

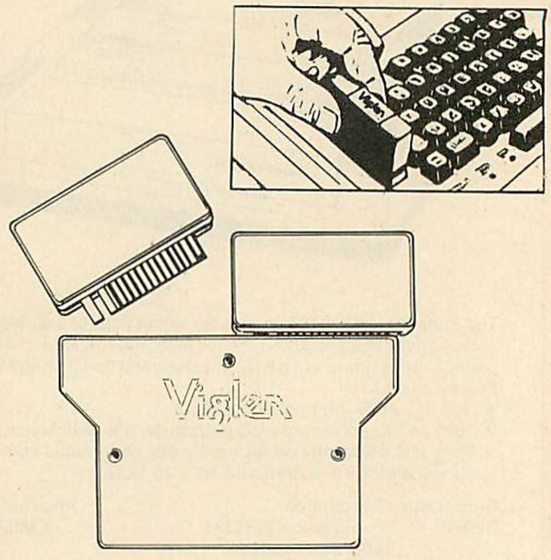
★ Remote Keyboard case with cable.
★ Metal screened main unit casing (including internal fittings for 5¼″ drives).
★ Two switches which can be used for 40/80 track switching and can be either fitted on the front or rear of unit.
★ Two blanking plates to blank out any drive aperture that is not used.
★ Full labelling kit.
★ Fully illustrated fitting instructions.

Stock Code	Description	Price inc. VAT
V861	Viglen Master Console unit	£59.95
Accessories for the Master Console unit		
V853	Dual Drive data cable for console unit	£9.95
V854	Dual Drive power cable for console unit	£7.95
V855	Power supply for the console unit	£34.95
V866	Fan Kit for console unit	£34.95
V858	Fitting bracket for 3½″ drive	£8.95
V851	Viglen Professional Console Unit for the BBC micro	£49.95
	Fitting service available from	£15.00

Please add £8 for insured courier delivery.

CARTRIDGE SYSTEM

VIGLEN ROM CARTRIDGE SYSTEM



Having fitted the Viglen Rom cartridge system to your BBC, Master or Master COMPACT, you can plug in your Roms/Eproms simply by inserting each one in a Viglen cartridge and plugging in whichever cartridge you want to use. The same Viglen cartridge can be used on all the micros mentioned and there is no need to switch the micro on and off between cartridge changes.

The Viglen cartridge system for the BBC micro consists of the cartridge cable assembly and socket, blanking off plates, 1 cartridge and cartridge storage rack. The cartridge socket when fitted protrudes from the rectangular slot on the left of the keyboard where the cartridges are subsequently inserted. It is simple to fit and requires no soldering.

The Viglen cartridge system for the Master and Master COMPACT simply plugs into your Master cartridge slot (or COMPACT expansion port) and accepts two Viglen cartridges. On the Master you can plug in up to two Viglen cartridge systems thus giving you access to 4 Viglen Cartridges simultaneously. The system comes complete with 2 cartridges and cartridge storage rack. On the Master you can also use Viglen cartridges which have 32 and 64K paged Roms inserted.

Stock Code	Description	Price inc. VAT
V560	Viglen Rom cartridge system for BBC	£12.95
V559	Viglen Rom cartridge system for BBC (low profile)	£12.95
V550	Viglen Rom cartridge system for Master	£14.95
V551	Viglen Rom cartridge system for COMPACT	£14.95
V561	Single Viglen cartridge	£3.45

Please add £2.50 P & P (£00.50 for single cartridge).

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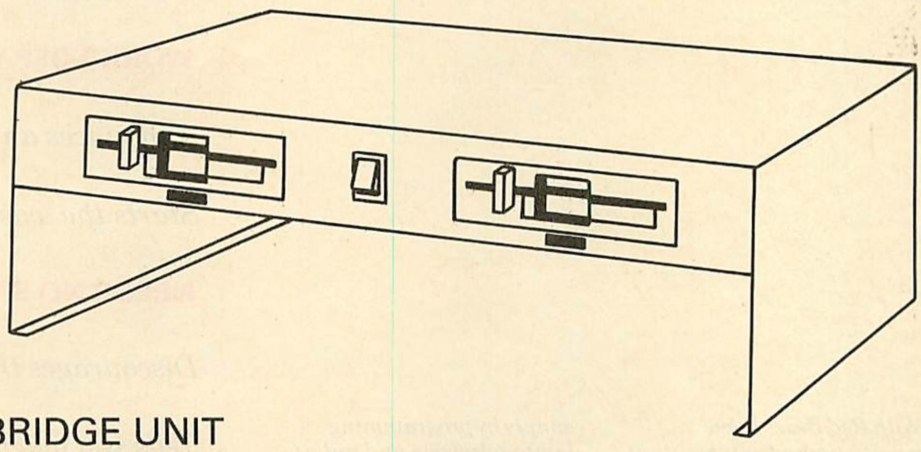
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Stock Code	Description	R.R.P.
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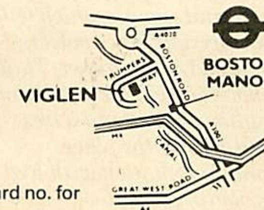


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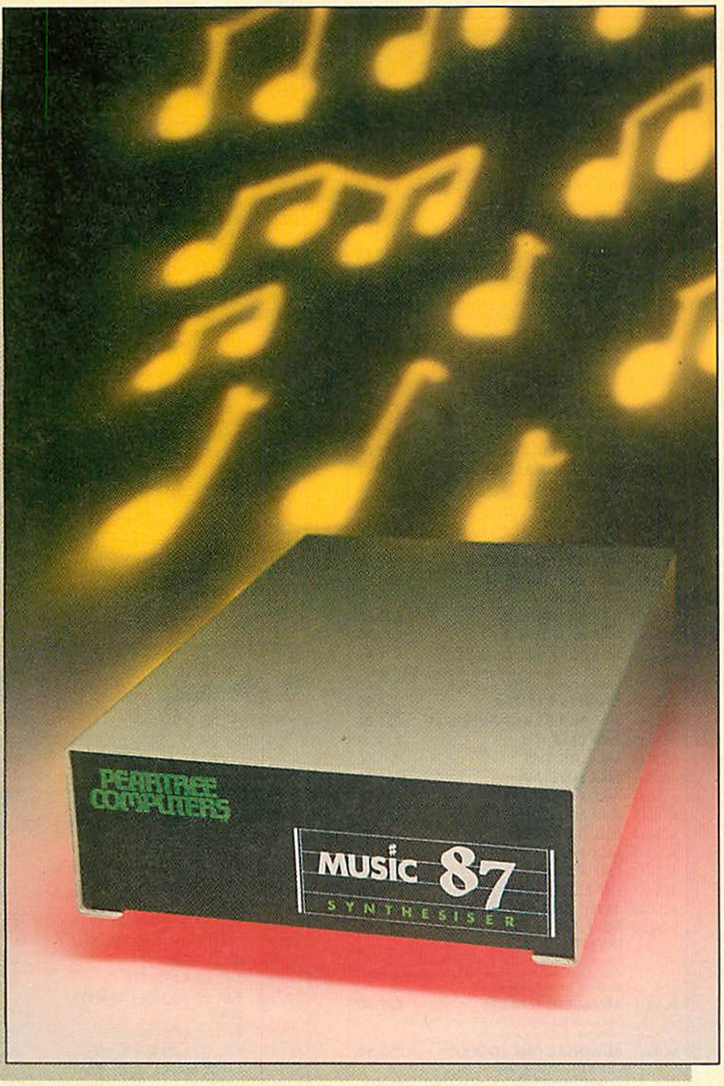
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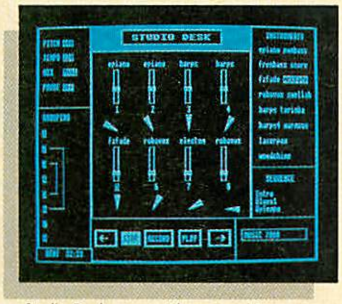
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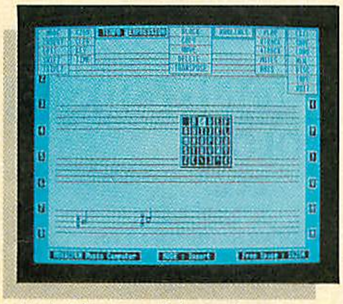
9 good reasons to buy the **MUSIC 87** rather than the Music 5000.*

FUNCTION	Music 5000	**MUSIC 87**
Mouse driven	✗	✓
2nd processor compatible	✗	✓
Light pen driven	✗	✓
Full 32k EPROM	✗	✓
Waveform designer as standard	✗	✓
Ability to bypass AMPLE	✗	✓
Graphic representation of waveforms, envelopes and score	✗	✓
Music printout as standard	✗✓	✓
Expensive	✓	✗

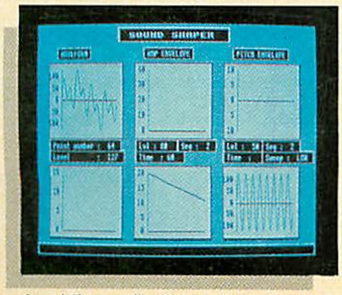
Price	Music 5000.*	**MUSIC 87**
	£161.00 Inc Vat	**£79.95** Exc Vat



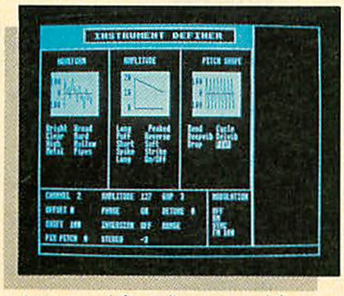
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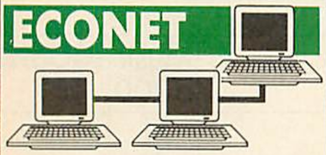
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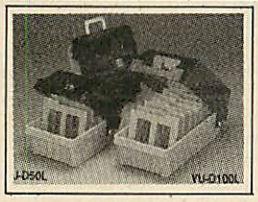
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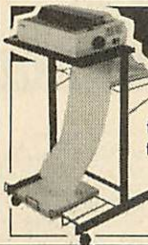
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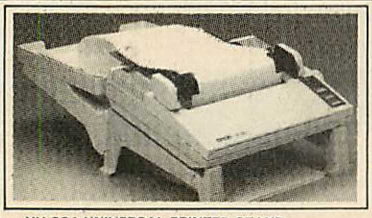
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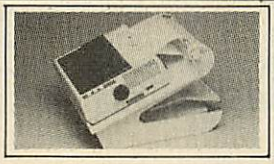


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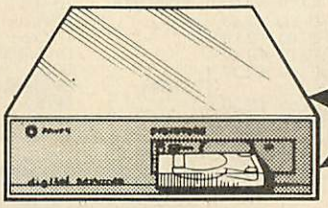
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LETTERS

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MISTAKE OVER MICROBRUSH

Sir, With reference to January's review of *Microbrush*, I have been using it regularly since it first became available. There have been various reviews in *Acorn User* of other art/CAD packages and I felt sure that when *Microbush* hit the limelight, you would be singing its praises at great length. However, since the overall flavour of the review did not, I feel, give this impression, I can only suggest that had a little more time been spent reading the manual before using the package, you too would have reaped the benefits, as I did.



***Microbrush*: Can make cuts**

Although you acknowledge that it is more versatile than any other system for the Beeb, you certainly boobed on one point. There *is* a cut and paste routine, although it is referred to as a screen editor and embodies a superb special effects system. It's well covered in the manual and offers much more than simple cut and paste.

I would agree that you can't master the system in five minutes, but just because you hold a valid driving licence, you wouldn't expect to be able to jump in and fly Concorde would you? I have tried most of the other systems available and by comparison they are very 'Mickey Mouse'. For the serious user, there is only one package that does virtually everything – *Microbrush*. Used with a Trackerball, it outperforms anything else on the market – including Watford's *Quest Paint*, which I have also tried out.

David Jackson
Paignton

CRICKETING COMPUTERS

Sir, As a cricket statistician, the winter months are devoted to my hobby and profession of compiling records from a busy English season.

So far with my BBC Master, *InterWord* and *InterSheet*, I have managed quite a few useful functions, but feel the Master could be put to better use with a form of database that could be used for compiling cricket averages and records.

Victor Isaacs
Association of Cricket Statisticians

FOOTBALL CRAZY

Sir, I think that the program most suitable for M Hyde of Liverpool, who wanted to keep a sports league, is *Football Follower* from Selec Software. It costs around £15. The program contains a menu option which enables a file to be created covering the user's own requirements. It has a maximum of 130 teams and 10 divisions, which would more than likely cover Mr Hyde's requirements. Display options include league tables, statistics of individual teams' performances and comparisons of either competing pairs or complete fixture lists.

K R Page
Lowestoft

ON THE BALL

Sir, M Hyde can use a database like Clares' *Beta Base*, costing around £25. Set up a database for each division with eight fields; name, played, won, lost, drawn, for, against, points. You can add wins and losses to the appropriate columns, then use an option from the main menu to calculate:

f(8) = f(3) * 3 + f(5)

Now sort the file on field 8, in descending order. You can print out the league table horizontally, using printer control codes 27,15,27,71 for pleasant condensed text.

Mike Jones
Manchester

Thanks to all those who have suggested solutions for Mr Hyde. Using a database capable of calculating field values like *Beta Base* might be of use to Victor Isaacs too.

STATISTICS SURVEY

Sir, N Pawar asked in January's Letters about reviews of statistics packages. Such a review was published by Henderson *et al* in the journal *Computer Applications in the Biosciences*, volume 3, pages 279-282 in 1987. The cheapest program, and among the most versatile, was *Microtab* published by Edward Arnold.

S Lazareno
Ware, Herts



A detailed work on BBC micro statistics (published by Edward Arnold at £49.50)

GRAPHICS IN PRINT

Sir, How do I print out the graphics screens on the *Acorn User* monthly listings discs?

M Richie
East Grinstead

Each disc contains a graphics bonus which can be loaded with *LDPIC BONUS, where BONUS is the name of the file. You need a screen dump ROM such as *Acorn User's UserDump* or a utility program on disc. If the screen dump command is *SDUMP, this will load and print the screen:

```
10 *LDPIC BONUS
20 *SDUMP
```

BLIND DATE

Sir, I have a BBC Master 128, which I use for letter writing. The letters are all kept on disc, the only printed copy being the one that is actually sent through the post.

However, when I came to look up one of my masterpieces, sent some time in the past, I was horrified. Because I'd used |D to date the letter, I couldn't find when it was posted. Can anyone suggest a way to keep that date for posterity on the letter in question? Or have we to go back to the old way of actually *typing* the date, forsaking the |D facility of the Master?

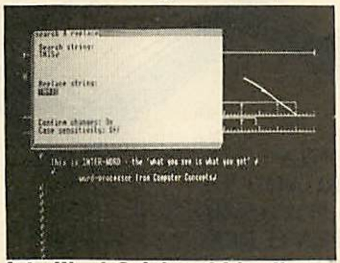
Alan Callaway
Exeter

One way is to include the date in the filename, so a letter written on February 11 could be called '0211LET'. You put the month before the day and the name, so the files appear on the disc catalogue in date order. On networks and the Archimedes, all files are date stamped automatically.

WORDPROCESSING ADVICE

Sir, I cannot agree with your comment that *InterWord* can be awkward in use (January Letters). I would thoroughly recommend it, though this is not to denigrate *View*, which I have not tried. Compared with *LocoScript* for the Amstrad 8256, *InterWord* is a paragon of user friendliness and speed. Any wordprocessing program requires some initial effort to get the hang of it, whether you are new to wordprocessing, or merely used to some other program. Incidentally, I still use *Wordwise* to create !BOOT files to load special function keys, initialise parameters etc for *InterWord*. There are other ways of doing this (*BUILD, or even a brief Basic program), but they are far less convenient.

As regards the number of books available, if you need them then the official manual is not what it ought to be (after all, a wordprocessing program is not as complex as a computer!). Indeed, I would look askance at a manual more than about six millimetres thick: either the program is bristling with features you will never need, or is unnecessarily difficult to use, or the manual contains a lot of verbiage (and some of them do!).



***InterWord*: Quick and friendly**

Ruben Hadekel
London SW6

***InterWord* is easy to use for some applications, awkward for others. For example, it's difficult to use a mixture of single and double line spacing, as found in most technical writing. However, *InterWord* is quick, and the menu system is very friendly.**

CANON CONVERSION

Sir, I was very interested in December's issue and was very pleased to find Stuart Rogers' NLQ printer driver. On reading the article I was posed with the same old problem: it needed alteration for my Canon PW1080 printer. The article took it for granted that everyone had the know how to change the program. I always enjoy typing in listings and find this very frustrating. Could you please help?

J Gilmour
Saltcoats, Ayrshire

The only change that is needed for the Canon PW1080 and Kaga 810 printers is:

1430 EQUB ASC ")"

ZENITH IS SAFE

Sir, In his monitors review in the December 1987 issue of *Acorn User*, Chris Drage raised some doubts over the suitability of the Zenith ZVM-1200 12-inch monochrome monitor for use in education. In particular, he queried the use of a two-core mains lead. In fact, as a safety feature, the monitor is double insulated, and it doesn't need to be earthed.



Zenith safety standards high

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Nazir Jessa
Watford Electronics

FAMILY TREES

Sir, I was pleased to note from Alan Clamp's letter in January that someone else was using the *Personal Ancestral File* on the Master 512. This is a first class program. The Society of Genealogists' journal, *Computers in Genealogy*, said it was 'a very good buy indeed.'

One important point to bear in mind when using the *PAF* on the Master 512 is that the 512 system can use several different disc formats, as pointed out by Graham Bell in the November issue. PC discs are usually formatted to store 360k of data, and some PC programs are designed for 360k discs only. They can corrupt discs using other formats.

This appears to be the case with the *PAF*. Using the BBC 800k data format I found that my files were corrupted when I had occasion to modify them. But using the IBM 360k format for data discs has given trouble free working.

Readers may like to know that I've found that IBM *Display Write 2*, version 1.5, works on the Master 512.

John Pettinger
Solihull

***Computers in Genealogy* is a quarterly newsletter published by the Society of Genealogists, 14 Charterhouse Buildings, London EC1M 7BA.**

VENI VIDI VICI

The address that you printed in January, for our wargaming magazine, *Veni Vidi Vici* was incorrect. Readers should write to: Brian Frew, 14 Lower Meadow, Edgeworth, Bolton.

Bernard Emblem
Bury

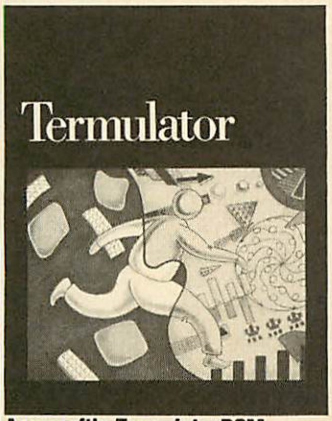
TERMINAL EMULATOR

Sir, Can you tell me who supplies a terminal emulator, either on ROM or disc based, for use on the Master 128 when connected via a modem to a DEC Vax computer.

I am looking for either VT100 or VT200 series emulation, with the Master keypad performing the same editing functions as the VT series and possibly with Tektronix 4010 vector graphics emulation.

Kate Crennell
Didcot

The most comprehensive terminal emulator available for the Master 128 is the *Termulator* ROM (Master version). It supports VT52, VT100 and Tektronix 4010 emulation, and is available from Acorn and its dealers.



Acornsoft's *Termulator* ROM

SHARING A HARD DISC

Sir, At my place of work we have a BBC B+ and a Master 128 linked to a Viglen 28Mb Winchester through a Technomatic four-way multiplexer.

This arrangement works very well, allowing both computers to work on the same random access file at the same time.

The only problem I have encountered is when one of the computers 'saves' a program or *Edit/Ultracalc 2* file, the other computer gives a 'Disc changed' error when it next tries to load a file. When I issue a *MOUNT command, I find that we have been put back to the root ($) directory. Have you or anyone else had this problem?

We now wish to add another Master 128 to the system, but this one is to be situated about 100 feet away from the multiplexer. Is it possible to extend the 1Mz bus that far?

R J Allen
Glasgow

The 'Disc Changed' error is inevitable, as the other computer alters the disc catalogue when it saves the file. Using two computers to access the same random access file in this way is a recipe for certain disaster.

***MOUNT always returns you to the root directory.**

Extending the 1MHz bus up to 100 feet is not really feasible, as the signals from the hard disc drive will deteriorate as they travel along the cable. Installing an Econet may be the best method; you've already got the Winchester, so all you'll need is the cabling, interfaces and file server software, plus a spare BBC micro as the file server.

SJ Research manufacture suitable networking equipment. Contact them at 108 Mill Road, Cambridge CB1 2BD. Tel: (0223) 69927


Hard discs: Two into one won't go

ACORN ACCUSED

Sir, I recently purchased an Archimedes 310. Two days later, I found the price had dropped by £115, and I noted *Acorn User*'s views on this move. Acorn refuses to comment, but I for one am finished with Acorn. Acorn says that customers buying early machines will receive free ROM upgrades and a wordprocessor, but what it doesn't state is that you'll need a backplane option and ROM podule to use them.

I have tried some old listings from *Acorn User*, including 'ThreeDee' from April 1986. Old BBC programs work fine on the Arc, but why does it rejects any machine code listings that I enter?

R D Stalker
Falkirk

You should by now have received your Arthur ROM upgrade, and the *Arcwrite* wordprocessor. You don't need a ROM podule or backplane to use them, as the 1.2 Arthur ROMs replace the ROMs on the main circuit board, and *Arcwrite* is on disc.

The reason that the Arc rejects machine code you type in is that Basic 5 only assembles ARM code, not 6502 code. To type in 6502 code, you'll need to run the emulator. *RMLOAD the module (65Arthur) and then type *EMULATEBBC, before entering or running your programs with 6502 machine code in them.

EIGHTY COLUMN OFFICE

Sir, I find the wordprocessor of *Mini Office 2* to be very useful, and adequate for my particular requirements. I can only use it in 40-column mode. I am told my BBC B does not have sufficient memory available to enable me to use 80-column mode. What do I need to add to my existing equipment?

N Reed
Huddersfield

You can add a shadow memory board to give your model B an extra 20k of memory which should be enough. Watford Electronics and Aries produce suitable boards. However, only the ROM version of *Mini Office* can make use of a shadow RAM board. If you are using either the tape or disc version, then you'll have to stick to 40-column mode.

UNDER USED LOCATIONS

Sir, If you need some memory then &90-&9F is safe if you are not an Econet user. &9F and &F9 are not used at all by OS1.2, nor are &39F to &3A6. If you are not using cassettes, then &380 to &3DF and &900 to &AFF are available.

Adrian Hall
Address supplied

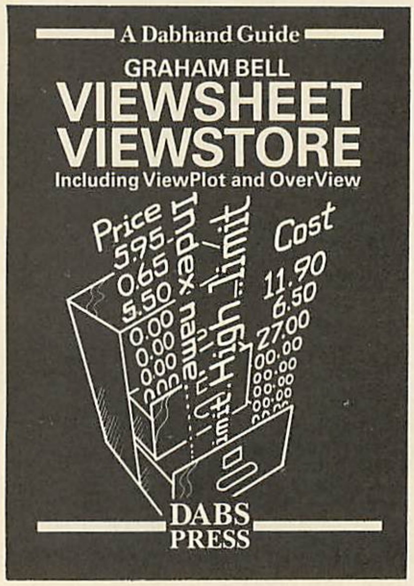
As many people spotted, the item in Forum in November should have concerned memory locations &A8-AF, not &AB-AF. The reason for using these locations is that they are within Acorn's programming rules, whereas the other locations mentioned are set aside for other things – Econet work space, cassette work space, and so on.

By all means use them, but be warned, your programs may not work on other people's machines, or with other versions of the operating system. Converting your programs later can entail a lot of hard work.

DABHAND GUIDE

ACORN USER OFFER

The Ultimate ViewSheet and ViewStore guide



Acorn User's Technical Editor, Graham Bell, provides the ultimate tutorial and reference work in his *Dabhand Guide to ViewSheet and ViewStore.*

This information-packed book covers every thing you need to know, whether you want to check a bank statement or run a multi-million pound business. Written to appeal to both beginner and experienced user alike it describes in detail how to set up, use and maintain spreadsheets and databases and provides comprehensive practical examples and utilities throughout.

The book is applicable to all Acorn machines and filing systems. Just some of the many topics covered include: absolute and relative replication, building an invoice system, database and spreadsheet design, use of SELECT and REPORT, using a printer, machine code utilities, plus large helpings of practical hints and tips.

The accompanying disc contains all the programs listed in the book plus many more, and comes with a handy manual.

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DIRECTORY ENQUIRIES

The ADFS' system of directories can be confusing at first – here's how they work. Plus your advice and programming ideas

Martin Phillips

The Advanced Disc Filing System (ADFS) seems to present problems to anyone who is used to the normal DFS. It comes with all BBC Masters, Master Compacts, Archimedes and with the Acorn Electron Plus 3. It differs from the normal Disc Filing System (DFS) which is supplied with the BBC, B+, Master and some Master Compacts in a two basic ways; the method of data storage, and the system for storing the catalogue of files.

The way data is stored on the disc is very different. One track of a DFS disc has 10 'sectors', each storing 256 bytes of information. A byte can be regarded as one normal character, a letter, number or whatever. An ADFS disc has 16 'sectors', each storing 256 bytes. The DFS format can have either 40 or 80 tracks per disc, depending on the type of disc drive being used. Each surface of the disc, top or bottom, is treated as a separate disc. The ability to use the second side of the disc, known as drive 2, depends again on the type of disc drive linked to the computer, not on the type of floppy disc. Almost every disc is suitable for two-sided use. The ADFS can also use either 40 or 80 tracks depending on the disc drive being used. However, it can also treat the opposite side of the disc as a continuation of the first side. The ADFS takes in terms of 'small', 'medium', 'large' and 'double' when referring to the format of discs.

- Small is a 40-track single-sided format, giving 160k of disc space.
- Medium is an 80-track single-sided format with 320k of disc space.
- Large is an 80-track double-sided format, offering 640k, of disc space.
- Double is a special Archimedes-only format using 80-track double-sided discs, but using five extra large sectors of 1024 bytes on each track. This gives 800k of disc storage on a 3.5inch disc. This compares with only 100k for a 40-track DFS disc, and 200k for an 80-track DFS disc. Of course using the second side of the disc adds an extra 100k or 200k.

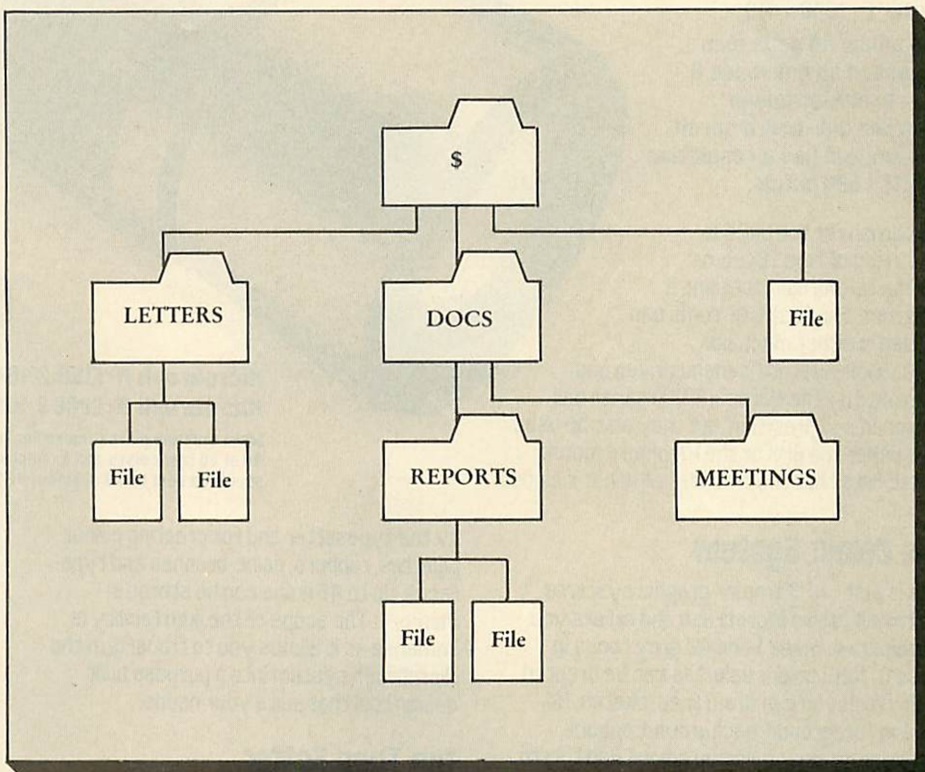


Figure 1. The branching tree structure of an ADFS directory

The way programs are stored on a DFS disc and an ADFS disc are quite different. The ADFS overcomes many of the shortcomings of the DFS system, and is very similar in operation to other disc systems like MS-DOS. The main disadvantage of AFS is that there is some loss of speed in program loading.

The DFS catalogues and stores programs in a very similar format to that of a book of short stories. There is an index at the start of the disc. The index contains the program name, of seven letters only, and the 'page number' of the program. The page number is given in terms of sectors. The sector is equivalent to a page in a book, and a new program always starts on a new sector. A major limitation of the DFS is that it is only able to have 31 names in the catalogue. Thus the catalogue can be full long before all the space on the disc is used up. This is especially annoying when you want to save a series of short word-processed letters on a disc. Each file is stored in order, much as each page of a story must follow the previous page. There are never odd pages inserted within the file. This is how the 'Can't extend' error crops up. A file can be stored on the disc between two other files. The space available for it is fixed by the gap between the two others. If you try to make the file longer, it gets too big for the gap, and because files are always stored in one piece, it can't be made any bigger.

The ADFS stores programs in a much more efficient way. It uses a series of directories, so there is no limit to the number of files stored in each directory. You can create a series of directories on

each disc. This is a hierarchical structure, a bit like a filing cabinet. Files are arranged within directories, or folders. Folders can be arranged within other, bigger, folders, perhaps equivalent to the cabinet's drawers, and all the folders are finally arranged together in the cabinet, known as $, the root directory.

Type *CAT on an ADFS disc, and the files usually appear followed by WR or something similar. Directories are followed by the letters D or DL. Figure 1 shows a possible simple hierarchical structure for a disc containing wordprocessor files. The first directory is called root directory ($), From this, two more folders have been defined: DOCS and LETTERS. These directories can then be sub-divided. The LETTERS directory contains two files, and it could of course have many more. DOCS contains two further folders, which might each have files in them. As you can see from the $ directory, a folder can contain a mixture of files and other folders if necessary. The whole system is arranged in a sort of branching tree structure.

There is some danger of losing files within the filing system as the system becomes more complicated. This is easier to do than you might imagine, as once in any sub-directory, you can't see those directories above and around it. If using a hard disc, then this problem can become a nightmare because of the vast number of directories. Here the sensible thing to do is to draw a map, or series of maps like figure 1 to show the structure of the directories.

To look at the use of these directories in the ADFS, take a blank formatted ADFS disc. Then create the directories in the following way:

```
*MOUNT
*CDIR LETTERS
*CDIR DOCS
*DIR DOCS
*CDIR REPORTS
*CDIR MEETINGS
*DIR $
```

The *CDIR command creates a new directory. Then you move into that directory using the *DIR command to make sub-directories from there. In order to start again from the root directory the *DIR $ command must be issued, otherwise the directories will be created as sub-directories of the current directory. It is worth noting that *DIR on its own has the same function as *DIR $. Once back at the root directory, any one of the paths shown can be followed downwards to get to the sub-directories. One cannot jump from one path to another: eg, the following will not work from the root directory:

```
*DIR DOCS
*DIR REPORTS
*DIR LETTERS
```

A 'Not found' message appears. In order to go from REPORTS to LETTERS the following path must be taken:

```
*DIR $
*DIR LETTERS
```

That is, you can go back to the root, then back down the path to LETTERS. One quicker way of doing this is:

```
*DIR $.LETTERS
```

Another way of doing this is to type:

```
*DIR ^.^.LETTERS
```

The ^ character means 'go up a directory', so ^.^ takes you up two levels, from REPORTS to $. You can see that dots can be used to string together directory names to move up and down the path is bigger steps.

A file in a directory can be loaded either from that directory directly or by including the path from the directory you're in to that file. Thus it is possible to load in a file from anywhere on the disc provided you know its path. To load a data file called 'CLUB2' from another sub-directory you could use the following command:

```
LOAD $.DOCS.MEETINGS.CLUB2
```

Or, if you're in the REPORTS directory:

```
LOAD ^.MEETINGS.CLUB2
```

CARING FOR YOUR CASSETTES

Cassette recorders need to be well maintained in order to work reliably with a computer. This isn't difficult to do, and can reduce the frustration caused by poor loading reliability.

Most importantly, clean the tape heads often. There are two heads on most small cassette recorders, the erase head and the record/replay head. (See figure 2). The latter needs regular cleaning, as does the rubber pinch wheel and capstan. To do this, take off the hatch above the tape mechanism if you can. There are often two little clips inside the cassette hatch that release the door. Do press them gently or they will break, and be careful of any springs which might want to fly out.

You can clean the inside of the cassette using a tape cleaning kit, but to save money, cotton buds and a drop of lighter fluid or methylated spirits work just as

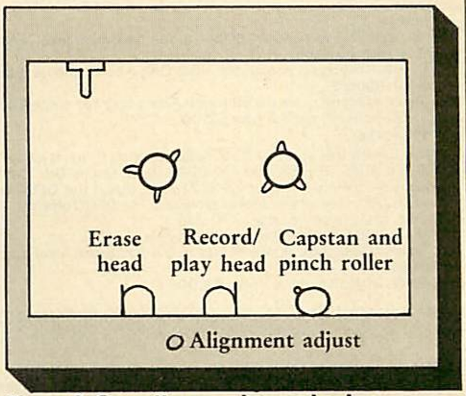


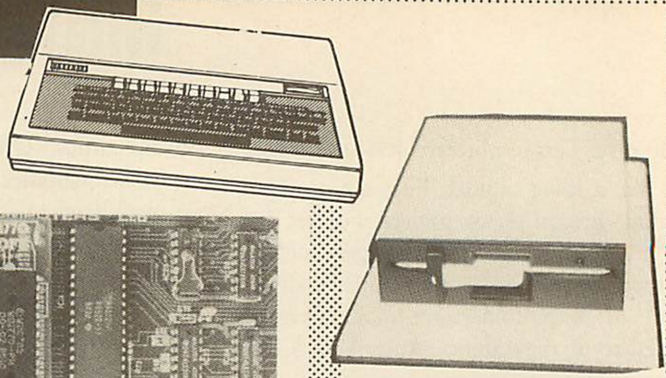
Figure 2. Cassette recorder mechanism

well. Take care, as these liquids are both inflammable. Push the Play button as this usually makes the heads easier to get at. Clear the head with a bud dampered with spirit. Treat the heads gently to avoid scratching them. It's also a good idea to clean any dirt or fluff out of the compartment. In general don't use a cleaning tape, as they are abrasive and will wear out the heads quickly.

If loading becomes difficult and the cassette is clean, then the tape heads could be out of alignment. To record and replay properly the record/replay head must be positioned parallel to the tape. There is a small cross-head screw usually at the left of the record/replay head to do this – it is often covered by a dab of paint. Most cassette players have a small hole to allow you to adjust this screw whilst the tape is playing. Its position is shown in figure 2. Insert a tape into the mechanism and listen to it as it is playing. You can turn the screw left or right using a small screwdriver, until the sound is clear, sharp and rather tinny. It sounds like turning the tone control up. Always use a pre-recorded tape such as the Welcome tape to do this, never a copy. It could even be a music tape. If the tape heads have been out of alignment for some time, then your own programs might not load after you've adjusted the heads, but commercial programs should load more easily. All you can do here is to try to load your old programs, then re-adjust the heads and re-save them.

Most cassette recorders switch off the internal microphone automatically when the computer lead is inserted into the DIN socket. Check your recorder does this by talking whilst making a recording from the computer. Now play the tape back and listen. If you can hear your voice as well as the recording, then you'll need to insert the little blanking plug into the external microphone socket when you save programs.

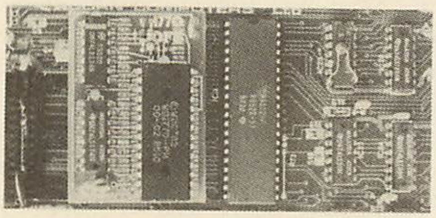
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DFS ROM

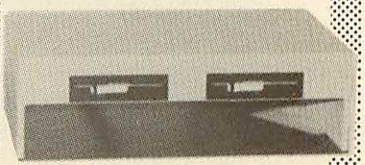
DFS ROMS:
Solidisk own DFS 2.2 and ADFS 2.1 ROMs have a superset of utilities and commands. They are also compatible with Acorn's latest DFS ROMs. Data sheets on these ROMs are available on request.

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ADFS and DFS Version 2.1 ROM set (32k, 2 chips) for the 1770 chip:
This is probably the best Disc Filing System ever made for the BBC, providing for single and double density DFS and ADFS. It has all the advanced features of the DFS 2.2 ROM plus a superset of commands for ADFS (Advanced Disc Filing system such as in use on the Master, Compact and Archimedes). Lots of articles have been published about the advantages of ADFS over DFS but little is known about advanced features of the Solidisk version versus the standard BBC (Acorn) version such as password protection, user defined number of files, automatic disc format detection, disc formatter/verifier and file transfer utilities which make the ADFS super-friendly. Furthermore, there is no copy-protection problem with the ADFS. Price: **£30.00** inc. or **£20.00** if purchased together with the 1770DFS (or DFDC).

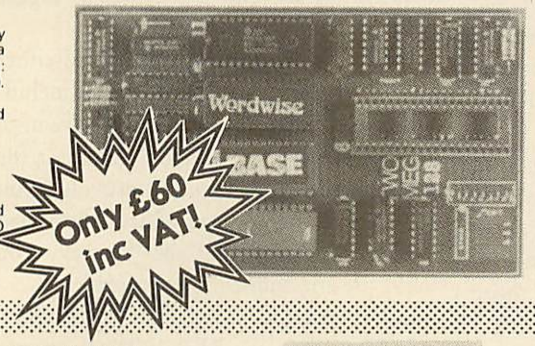
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MEMORY

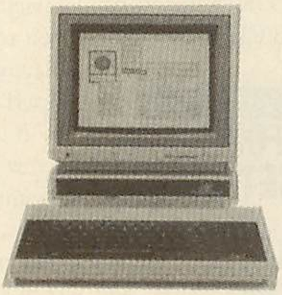
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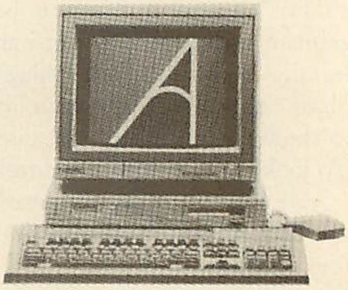
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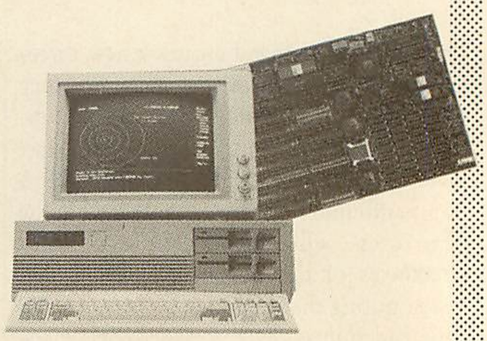
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SOLIDISK — WHERE TECHNOLOGY MATTERS

USING THE LIST IF COMMAND

A useful extension to Basic on the Master series and Archimedes is the LIST IF command. It is a simple way of finding lines in a listing, or checking variables.

In a long program, try some of the folowing options:

LIST IFDEFPROC

to list all the lines containing a DEF-PROC.

LIST IFB%

to find all the lines with B% in them.

LIST IF10

to list the lines with the number 10 in them. It will ignore line numbers, so it doesn't list line 10.

LIST IFA

lists each line containing an 'A'. It will ignore any keyword with an A in it, like ADVAL,as these are tokenised.

LIST IF%

will find all the integer variables.

In a long program, it's easy to lose a procedure. Using LIST IFDEF it is very easy to find the starting line number of the procedure. One important point is that you shouldn't put a space after IF, or it will search only for occurrences of DEF which are preceded by a space. It is possible to restrict the search line numbers:

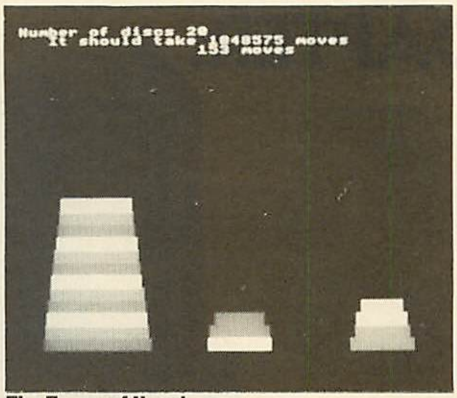
LIST 100,300 IFPRINT

will find all the PRINT statements between lines 100 and 300.

THE TOWER OF HANOI

This month's short listing solves the age-old Tower of Hanoi problem. This a mathematical problem where three pegs are fastened to a stand. There are also a number of wooden discs, each with a hole at the centre. The discs are all of different diameters. They all start in a pile on one peg, arranged in order of size with the largest disc at the bottom. The problem is to shift the pile to another peg, by transferring one disc at a time. The catch is that no disc may be put on top of a smaller disc.

The number of moves required rises rapidly with the number of discs used, and is given by the formula $m=2^n-1$ where n is the number of discs. If n=3 then the number of moves (m) is seven; with four discs the number of moves is 15, and with 15 discs this number rises to 32767 moves!



The Tower of Hanoi

This is good example of recursion greatly simplifying the programming. The program, listing 1 on the yellow pages, has only two procedures, PROCdraw and PROCproc. PROCdraw draws the disc in one of the three piles. By starting with this procedure and defining each disc in terms of four parameters, this simplifies the rest of the program:

DEFPROCdraw (pile,n,height,col)

The four parameters required are 'pile' which is the pile (1,2 or 3) which the disc is, 'n' which is the number of the disc, 1 being the lowest disc in the starting pile. 'height' is the height in the appropriate pile at which the disc is to be drawn, and 'col' is used to indicate whether the disc is to be drawn or erased, ie, drawn in black. Two variables determine the size of each disc. As n increases, the width of the disc is reduced. The width also takes into account the variable size%, as does the height of the disc. This variable is determined by the number of discs you start with. With lots of discs, they are made thin so that the display will still fit on the screen. If there are few discs, then the height of each disc is fixed at 64.

PROCproc is the recursive procedure to move the discs. A stack is created at location D. D?1 is the destination pile, D?2 is the intermediate or transfer pile, and D?3 is the source pile. D is a pointer to the stack. A%?1 is the number of discs on pile 1, A?2 is the number if discs on pile 2 and A%?3 is the number of discs on pile 3.

Speed is an important consideration in this program, as the number of moves may be so great. Out of interest here are some timings for four machines:

Machine	Five Discs	10 Discs
BBC B	4.31s	142.75s
BBC Master	3.55s	117.18s
Archimedes	0.55s	17.17s
RM Nimbus	1.98s	64.9s

£10 WORDWISE STRING SEARCH

Mike Roden from Manchester wins himself £10 for useful *Wordwise Plus* segment he's developed to search for a string while in the edit mode. Like many, Mike has found the normal search and replace a bit tedious, especially when you have forgotten to move the cursor to the top of the text first. Mike's routine asks for a search string from the edit screen, and does not require a replace string. Thus it can be used to move quickly to any point in the text without having to leave the edit screen. I found it particularly useful for correcting mistakes and altering text after I had read through a paper copy. It is an advantage to be able to jump quickly to any point in the text.

This program, listing 2 on the yellow pages, resides in one of the segments and can be called up quickly by pressing the appropriate function key together with Shift. It could be included in the *Wordwise Plus* menu program from May 87.

When the segment is run, it disables the Escape key with *FX 229,1, and takes the cursor to the top of the text that is being edited. This text can be in the main text area or in a segment. The program sets up a small window at the top of the text to prompt for the search string. Next it looks for any markers present, and if it finds any, prompts for the search to be confined to the marked piece of text. This is useful if you know the string lies within the area of marked text. Then the FIND command is used to look for any occurence of the string. Take care, as FIND is case sensitive. As soon as the search string is found, the program beeps and 'Is this it? (Y/N)' is shown at the top of the screen. Pressing N will continue the search, pressing Y will leave the cursor at that point.

The clever part of the program is the way the cursor is able to move back to the marked point in the text after a prompt is displayed. Mike discovered that in the edit mode the cursor always remains on line 13 and the horizontal position of the cursor can be found in location &7E. C% is assigned to this position before the prompt message is displayed, and VDU 31 (Tab) is used to return the cursor to this point. Although this location is the same in both versions of *Wordwise Plus* that I've tested, 1.4A and 1.4E, it could change in others.

Would anyone care to produce a list of other *Wordwise Plus* locations?

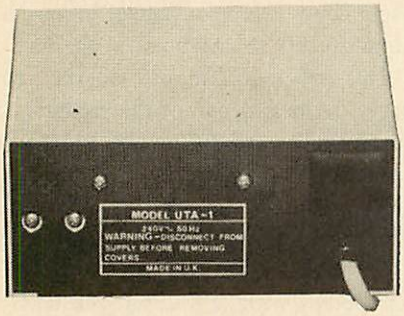
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FIRST BYTE

WHAT'S BUGGING YOU?

Getting magazine listings to work is a heart breaking business. Here's some sound advice

Tessie Revivis

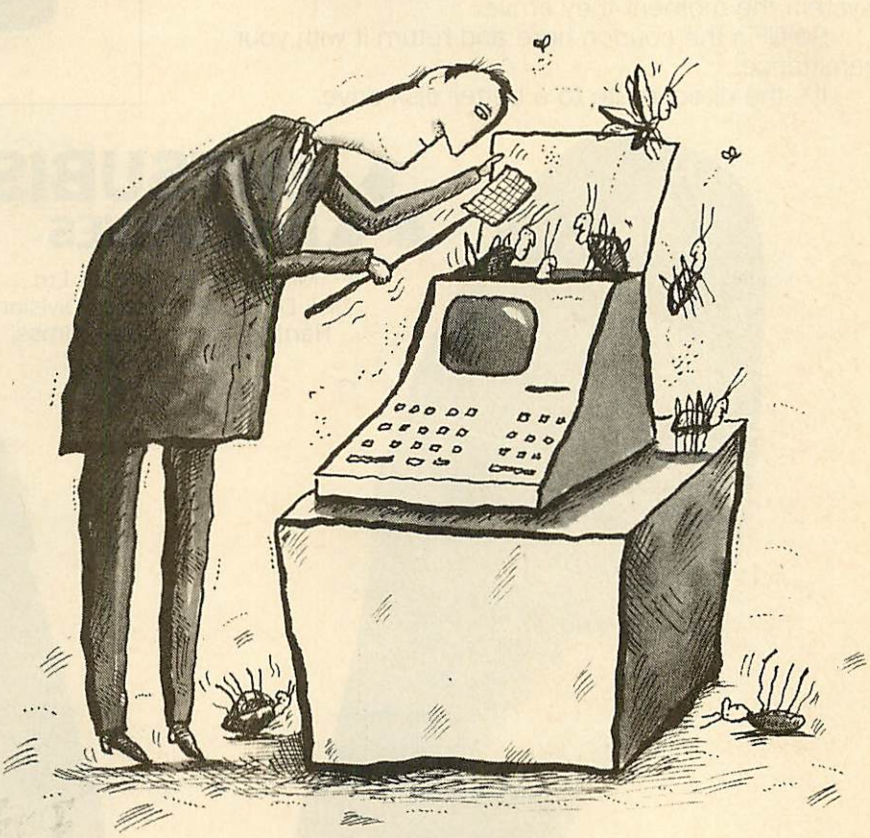


ILLUSTRATION BY AXEL SCHEFFLER

A program that runs first time after typing it in is a very rare thing indeed – not even the experts can manage it, so don't feel like pulling your hair out if it happens to you. The trick is being able to correct the errors – bugs as they are often called – and get the program to run as it should.

Whether you are writing the program yourself, or typing in a listing from the yellow pages, the techniques are basically the same. Of course if you have written the program yourself then it may well be trying to do the impossible – which is difficult to cater for in a magazine article! So this month we'll keep to debugging programs that you know work.

Despite rumours to the contrary, the programs presented in the yellow pages are tested and dumped direct from a working copy to ensure that the program is correct and will work when it is entered. The first thing to do is to read the article that goes with the listing. An obvious point perhaps, but experience has shown that many problems occur because the program has not been entered correctly, or perhaps relies on another program or data file to work. Understanding what a program is going to do, and how it will go about doing it, is half the trick in getting it to work.

The next step is to ensure that the program will run on your micro, and this can be seen from the compatibility table or the first four REM statements of a yellow pages listing. A program written for a Master 128 using Basic 4 may not run on a BBC B running Basic 1, so check this before you start. Similarly, some extra hardware might be required; for example:

```
30 REM B/B+/M with 6502SP
```

This shows the program won't run on a Beeb or Master 128 without a 6502 second processor or Turbo co-processor attached.

Next look for any special notes on how to enter the program. PAGE may have to be set to a new value for instance, or an Econet interface may need to be disabled. These problems may not stop you from entering a program, but could cause problems when you type in RUN.

When you are quite sure you have done all the pre-entry checks, you are ready to start tapping away at the keyboard. To make this as easy as possible, the majority of program listings are entered on lines which are numbered at intervals of 10. This not only makes entry simple, but makes it easy to spot any missing lines.

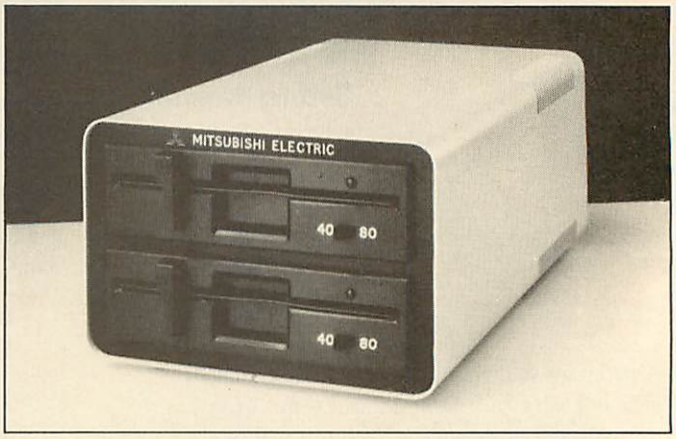
Basic contains an automatic line-numbering command for just this purpose – AUTO. Just type this in, press Return and the first line number, 10 should be displayed. The flashing cursor shows where text will be typed as you enter it at the keyboard. And away you go. Pressing Return at the end of each line will display the next line number in the sequence. But notice that, because of space limitations, programs listed in *Acorn User* are not printed full width from one from one side of the pages to the other. You shouldn't press Return at the end of each line as it appears on the page, only at the end of a line where the program finishes for one line number and begins another.

Many programs, especially if they are of a tutorial nature, will contain lines with REMs in, eg:

```
250 REM read name from file
```

REM stands for REMark and is simply a reminder of what is to follow. It is not vital for the program's operation and could be left out – simply press Return when the line number is presented to do this. If you

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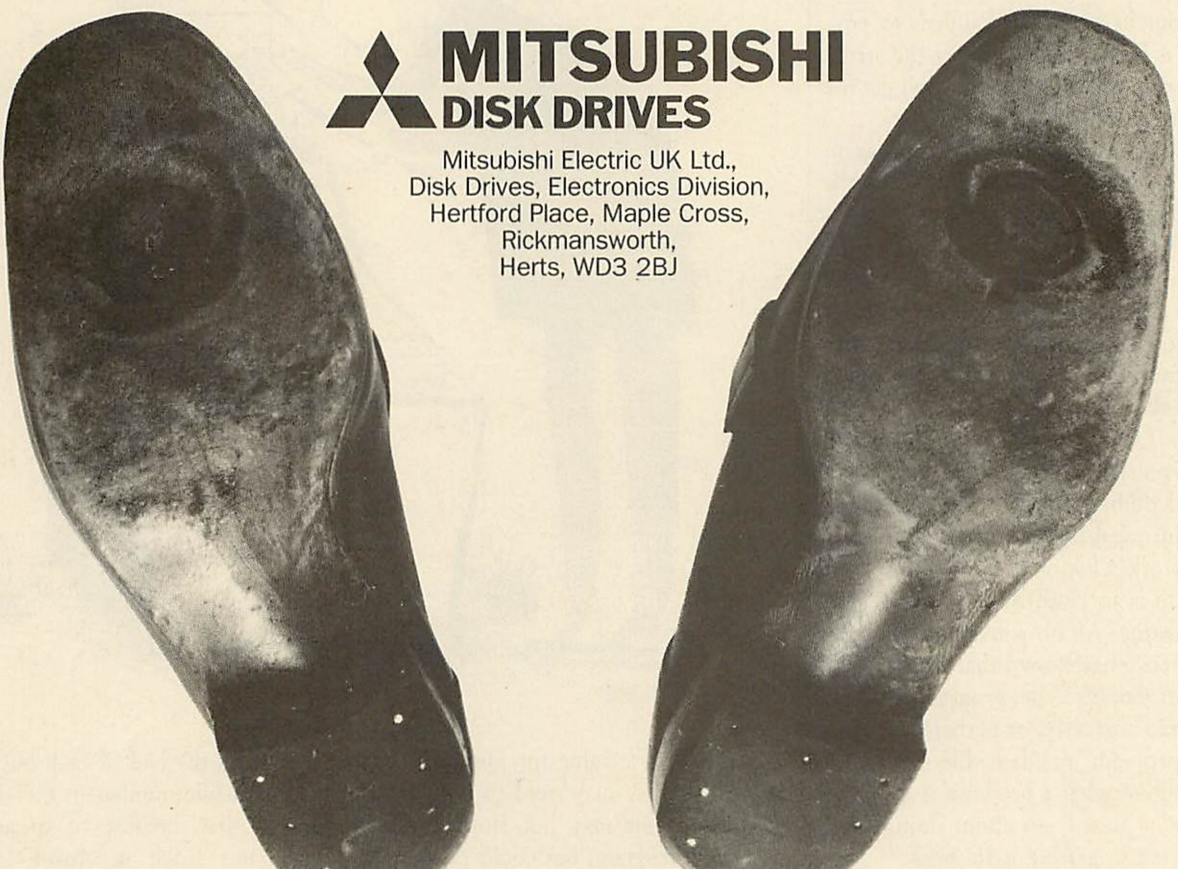
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make a typing error during entry, and you undoubtedly will, you can only edit the error by deleting it with the Delete key. Thus if you notice something is missing from the line you're on, you will have to delete the intervening section of program line. If the error is on another line, you can't get at it while using AUTO. The solution is to revert to pen and paper – make a note of the line number and the error and come back to it when you have finished entering all of the program.

Once you have entered the listing, *save it*. Never run a program before saving what you have entered. If you have made even a simple error, programs can quite happily destroy themselves and waste all your typing work. It doesn't happen often, but it does happen. With a copy safely on disc, if you have problems you can simply type NEW and load the program back in.

In addition, when entering a long listing it is good practice to stop and save what you have done at regular intervals – just in case. In fact, the November 1984 issue of *Acorn User* contained an automatic program saver which saves the current program every four minutes, and this is included on this month's listings disc for your convenience.

Before you run the program, look down the listing to see if it contains any ON ERROR statements, eg:

```
90 ON ERROR GOTO 150
```

If it is similar to this, delete it for the time being. The reason for this is that without the ON ERROR, Basic tells you what sort of an error occured when a program goes wrong. With ON ERROR, it performs the rest of the program line instead, so you don't find out about the error. The worst sort of ON ERROR lines are ON ERROR RUN statements – generally they are not used in *Acorn User*, but then it may occur in programs listed elsewhere. If this was left in, then when an error occured this command would be executed and re-run the program. Of course the error would occur again and the program would be re-run over and over. The problem in the program would never be revealed.

Now run the program and try to use it as described in the article. Remember to check in the article or notes with the program, to see if you have to pre-set any parameters such as PAGE. If the article says nothing about PAGE settings, then simply type RUN and press Return. At this stage, it's almost certain that an error will occur – unless you are an incredible typist! One of the most common error messages is:

Syntax error at line 120

The error message displays the line number of the line which is confusing the computer. This type of error almost invariably means that you have mis-spelt something in your typing. So list the line, in this example line 120, and compare it carefully with the printed listing in the magazine. If you can't see the error then look very carefull at number 0s and letter Os, plus number 1s and letter ls. These often look similar when printed, and are confused and exchanged very, very frequently. Another difficulty is with pound signs; they are very rarely used in listings, and it could be that a hash (#) character was intended. Some printers confuse the two, but great care is taken with the yellow page listings to ensure this doesn't happen.

Another error message which is very commonly seen is:

No such variable at line 1120

Here the computer has come across a variable that it cannot recognise, and once again it is likely to be a spelling mistake. The listed line could be correct, as you might have spelt the variable name incorrectly in another line. So you will have to check every occurence of the variable until you locate the bug.

If there are several variables on a line, like this:

```
130 three%=one%+two%
```

then you can find out which one is at fault by printing their values. It can never be the variable to the left of the equals, so try PRINT one% and PRINT two% to see which one causes the problem.

Each time you make a correction, re-save the program and run it again, correcting the errors one by one.

Another common error is:

No such FN/PROC at line 120

This message suggests that there's a mistake in line 120, and there may well be. However, line 120 will contain a call to a procedure or function, like this:

```
120 PROCtest
```

and if this is correct, it is almost certain that the error lies in the lines which define PROCtest. So this block of lines must be found and then examined one by one. Once you find the line with DEFPROCtest, the error might be obvious. If the procedure or function is short, a simple typing error can be very easily spotted.

I have only touched on a few of the more common error messages. You will encounter many more at various times – they are all documented in the User Guide. Find out what they are, look at the erroneous line, and if that fails look elsewhere in the program. Check other lines that mention the same variables as the error line in particular. On the Master series, you can use LIST IF to find all the lines on which a variable occurs. You can always find out the line number of the last error by typing:

PRINT ERL

The last error message can be repeated with:

REPORT

Logical errors are frequently encountered and loops are a prime source of this type of error. You may use a variable in a loop that has been used elsewhere in a program for instance, which can cause all sorts of problems. Rule one is always to keep a note of all variables that you use in a program to ensure you don't use them twice. For example, there is a problem with:

```
10 FOR N%=0 TO 10
20 PROCcheck
30 NEXT
40 :
160 DEF PROCcheck
170 IF N%>0 THEN N%=0
180 ENDPROC
```

This program would never finish, as N% is set back to 0 each time round the FOR-...NEXT loop. In cases like, this inserting an extra line which prints out the variable will reveal the nature of the problem:

```
15 PRINT "Current N% is ";N%
```

The use of the TRACE command would also clarify this type of error. Typing TRACE ON before running the program causes the computer to print the line number of each line as it is executed. In a large program this could narrow down the bug search area to a specific region. TRACE OFF cancels the line number display.

Programming aids, such as *Sleuth* from Beebug, can be useful, but they still depend on your knowing what to look for in the faulty program.

Strange as it may seem, bug hunting can be fun, and it is very rewarding when you solve the problem. Experience plays a part too, and the more programs you debug the better you will get. A final word – if you are really stuck, a breath of fresh air and a quiet ponder way from the computer can do wonders.

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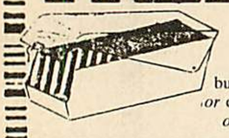
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ACORN FORUM

TAKING BYTES TO BITS

Routines to disassemble Arc machine code, prevent you accidentally overwriting files and use a digital joystick

David Atherton

Well-known *Acorn User* author Peter Sandford has recently upgraded to an Archimedes, and he has been investigating the Arthur operating system.

He has found a number of excellent utilities incorporated into the Archimedes ROM. He's got release 0.30 Arthur, but the following applies to later versions too. The utilities are not documented in either the Welcome Guide or the User Guide, although typing *HELP . (space, then full stop) can yield some useful information.

One of the most interesting of the utilities is the debugger module. This includes the command *MEMORYI which will disassemble ARM machine code in memory into ARM assembler instructions. This can be incorporated into a function key definition to act as an instant disassembly tool:

```
*KEY1 INPUT"Address : ",A
$:A%=4*EVAL("&"+A$) DIV 4:RE
PEAT:OSCLI("MEMORYI "+STR$~A
%+" 4"):K%=GET:A%+=4:UNTIL F
ALSE|M
```

Press the key, and the machine will prompt for a start address (in hex), and disassemble the first four bytes into one 32-bit instruction. Press the space bar to continue the listing or Escape to exit.

The program listing supplied by Peter, listing 1 on the yellow pages, is a more sophisticated utility which can be used as a combined disassembler and memory dump. Using the cursor up and down keys, you can move backwards and forwards in memory. By pressing the Tab key, you can toggle between a disassembly mode (which will disassemble one ARM instruction at a time), and a memory display mode (which uses the command *MEMORY to display a block of 256 bytes at a time).

Peter has found the utility to be extremely useful in examining the contents of the relocatable modules supplied in ROM and on the Welcome disc. You can use the command *MODULES to obtain the start address of the module. On an Arc 310 fitted with Arthur 0.3, the display will list the modules fitted. The first one is shown in the figure above.

```
Start address : ?3840970
03840970 : .... : 00000000   ANDEQ   R0,R0,R0
03840974 : Δ_.. : 00005FC4   ANDEQ   R5,R0,R4,ASR #31
03840978 : .... : 00000000   ANDEQ   R0,R0,R0
0384097C : L£.. : 0000604C   ANDEQ   R6,R0,R12,ASR #0
03840980 : $... : 00000024   ANDEQ   R0,R0,R4,LSR #0
========

Address  :    3 2 1 0    7 6 5 4    B A 9 8    F E D C :  ASCII Data

03840980 :   00000024   00000033   0000004F   00000000 : $...3...O.......
03840990 :   00000000   424D5241   63697361   74696445 : ....ARMBasicEdit
038409A0 :   5400726F   41206568   6E726F63   53495220 : or.The Acorn RIS
038409B0 :   61422043   20636973   74696445   4100726F : C Basic Editor.A
038409C0 :   45424D52   00000000   0000050C   00FF0000 : RMBE..........█.
038409D0 :   00000000   00000069   746E4500   74207265 : ....i....Enter t
038409E0 :   45206568   6F746964   73752072   20676E69 : he Editor using
038409F0 :   54494445   6F726620   6142206D   00636973 : EDIT from Basic.
03840A00 :   E8AD438E   E1A09000   E59C822C   E59F7058 : ëC┤0.ä°α,ÄûεXp§ε
03840A10 :   E28C0F7B   E28C1F87   EB000005   E3500000 : {.àβ©.àβ...λ..Py
03840A20 :   1A000002   E28C0E1F   E28C1E22   EB000000 : ......àβ".àβ...λ
03840A30 :   E93D838E   E8AD4000   E4902000   E4913000 : ëÇ=ι.@┤0. äδ.0äδ
03840A40 :   E1520007   0A000004   E1530008   13A00000 : ..Rα......Sα..°.
03840A50 :   1A000004   E1520009   020990DF   E4809000 : ......Rαñä...äÄδ
03840A60 :   E4818000   E3A00001   E93D8000   20202020 : .äÄδ..°y.Ä=ι
03840A70 :   E8AD400F   E1A03000   E1A02001   E3A01000 : .@┤0.0°α. °α..°y
```

The ARM Basic Editor, memory dumped and disassembled

```
*MODULES
Position Workspace Name
03840970 01802CD4  ARMBasicEditor
```

***MODULES shows the module's position in memory**

This shows that the start address of the ARM Basic Editor module is at &03840970. The first few bytes of the Editor are shown disassembled at the top of the page.

Peter has also pointed out a problem with the Archimedes cable diagram given in Forum, November 87. The Archimedes end of the diagram is shown looking into the plug. If you follow the pin numbers you'll be right, but to see the connections looking into the socket, you should draw a mirror image of the printed diagram.

OVERWRITE WARNING

The other three items in Forum this month are all 'patches', that is, alterations or extensions to the operating system. You can add patches by changing the vectors in page 2 to jump to user code instead of into an operating system routine.

For a long time, I have admired the warning message given by *Wordwise Plus* when you are about to save a file under the same name as one that already exists.

The feature is specific to *Wordwise* and I have lost many 'latest version' files because

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ACORN FORUM

View and Basic don't have the same feature. To remedy this, I wrote this short assembly language program, listing 2. The program assembles some machine code at &900 in memory, and starts it up. After this, every SAVE operation performs a check to see if the filename being used already exists. If so, it gives a warning message 'Are you sure? (Y/N)' and waits for a Y (or y) response before proceeding to overwrite the old file. Any other key means no, and the SAVE is aborted. When you have created the machine code, which is saved under the name WARN, you need only type *WARN to install it. Trying to install it twice will have no ill-effect, and you are told that the patch is already installed. The installation is cancelled by pressing Break, or by a change of filing systems (say by typing *TAPE), and by some ROMs when they are initialised.

The program must be installed in the I/O processor, although it will run with an active second processor. If you're using a second processor, make sure that the load and exec addresses of the WARN file are &FFFF. The program works by intercepting the Filev vector located at &212 on the I/O processor. Every time the vector is called, during every Osfile operation, the accumulator is tested to see if it is a save command (value=0). If so, the registers are preserved, and Osfile with A=5 is issued. The call is used for reading catalogue information, but also returns in a value the accumulator to show whether a file is present. The call accesses the disc to do this. This program doesn't differentiate between files and directories, so if A is non-zero on return, the file exists. At this point, unless the file exists, the normal save operation takes place. Otherwise, the message is printed, the keyboard buffer is cleared, and a keypress is read from the keyboard. If the key is Y or y, a jump is made to the standard exit point, where all registers are restored, and the program jumps to the old Osfile vector. If any other key is pressed, the registers are restored but the routine returns to the calling language without accessing the filing system.

The routine uses most of page &9 for code, and a 17-byte buffer for Osfile A=5. Also three bytes of zero page are used from &90-&92. (Econet work space) although obviously these values can be changed. As assembled, the program will run quite satisfactorily with *View*, *Wordwise*, *Edit*, *Terminal*, BBC Basic, Comal and probably most other languages.

*DRIVE COMMANDS FOR ADFS COMPATIBILITY

Martin Hesketh has found that when converting software to the ADFS, problems are encountered if the software tries to select a different drive using *DRIVE. The Master Compact recognises this problem and implements *DRIVE (n), which translates to *DIR :n.$. Martin's program does essentially the same thing for earlier versions of ADFS. However Martin goes further in offering a choice of directories to be selected for the four possible *DRIVE parameters. This allows you to take a program which maybe occupied two or even four surfaces in DFS, and put it on a single ADFS disc.

When you run listing 3, you will be asked for a directory to be selected for each of the four possible *DRIVE arguments. All directories are taken from the root directory. So if PROGRAMS is the directory to be selected when a *DRIVE 0 command is executed, then the command will be accepted as *DIR $. PROGRAMS. Because of this full pathname requirement, the program will, once installed, work correctly whatever the current directory.

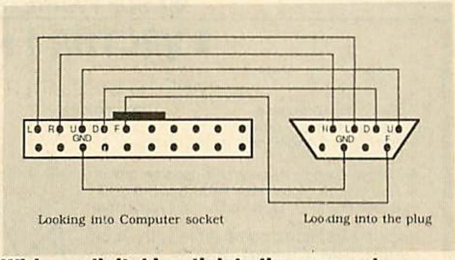
The program will then be assembled, and saved under the name 'DRV'. To activate the patch, you should type *DRV. After this, until the next Break, the *DRIVE command will select directories as needed.

The program also intercepts *D. commands, but not *DISC commands. On the Master 128 *D. is an abbreviation of *DELETE, not *DISC. If a *D. command is recognised then the DFS is selected. This can be changed to ADFS by changing the line LDY #4 after the label '.disc' to LDY #8.

The program works by intercepting the Oscli vector, cliv, and checking all star commands. If the command is *DRIVE, then the argument is read, and the appropriate directory is selected using Oscli, the full *DIR command having been set up at assembly time.

DIGITAL JOYSTICK INTERFACE

Ahmed Qamruddin of Skelmersdale has sent in a program which allows you to fit an Atari-type digital joystick to the user port of your BBC. This is not entirely new, but Ahmed's solution happens to be



Wiring a digital joystick to the user port

one of the neatest and simplest I've seen.

When you make up the cable and run the software provided, you'll be able to control many BBC games with an Atari joystick, which, because of its switched rather than proportional action, gives you better response. Ahmed says that the old games *Killer Gorilla*, *Rocket Raid*, *Arcadians* and so on, all work fine, although more recent games which access the ADC chip directly, overwrite vectors, or disable the user port won't work.

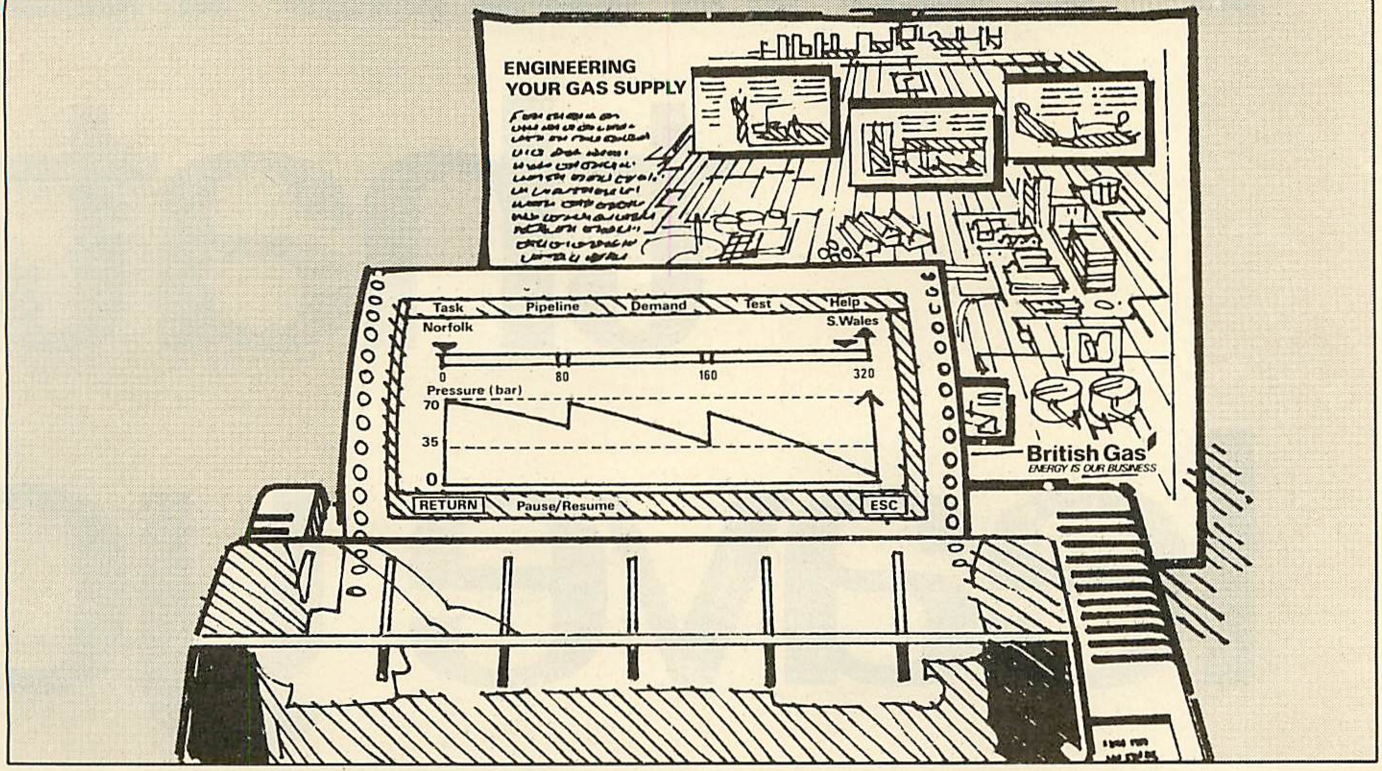
Some wiring up is required, as shown in the diagram. You'll need a 20-way IDC connector, ribbon cable and a nine-way male D-type plug. Connect this up as shown. The diagram shows the view of the user port connector as seen from the outside, and the joystick plug as seen from the outside. You'll need a soldering iron and a crimping tool or vice to fit the IDC header. When everything is done, plug one end of the cable into the user port and the other end into a joystick, run the software and away you go!

The software in listing 4 on the yellow pages works by intercepting Bytev, and substituting values for Osbyte 128, the call which reads the ADC. The values returned are always zero, 32768 or 65535, which equate to a proportional stick being moved hard to one side or the other or moved to the centre. The user port lines are normally set to one if nothing is connected, but return a value of zero if grounded. The switches on the joystick ground various bits of the user port so the code checks the port before returning the false value.

The code may be left as Basic source code, and run before a game is used. The code resides at &880, the end of the parallel printer buffer. So as long as the printer is not used, the code should not be corrupted. It is important not to press Break, as this cancels the effect of the code. That usually means that you can't start up the game with Shift-Break – you can usually use *EXEC !BOOT instead.

Details of the Acorn Forum Listings are on page 113.

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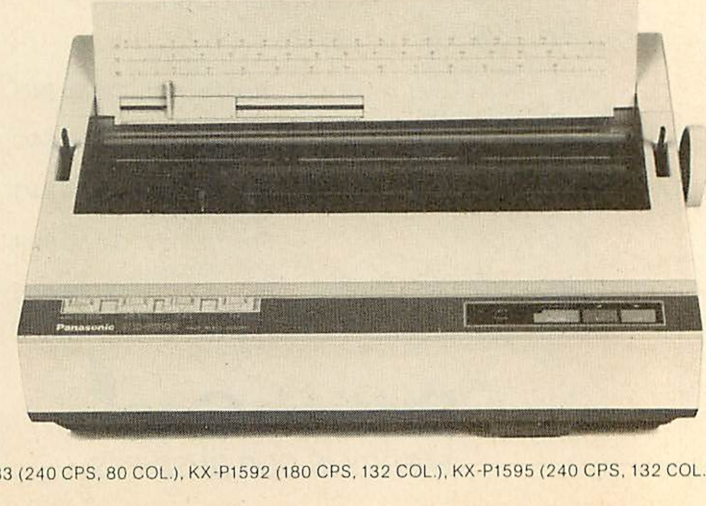
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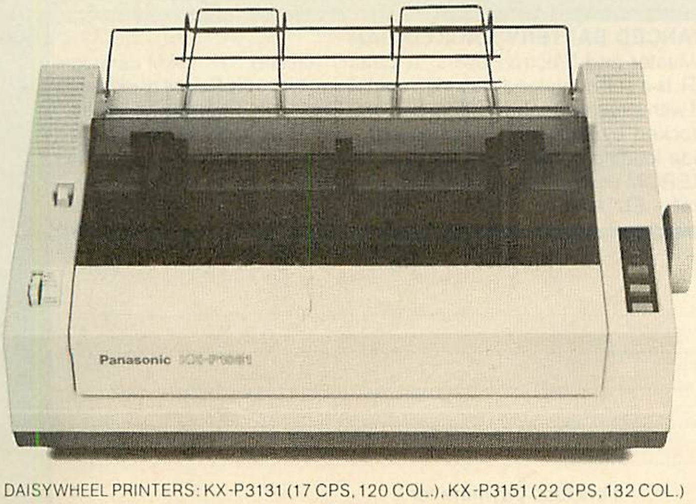
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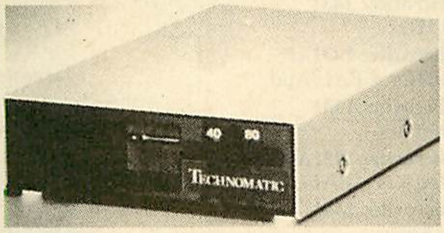
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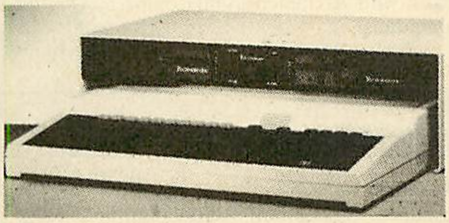
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TDM4 Four computers/one drive unit	**£115(b)**

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Technomatic offer the most popular range of Winchester drives for BBC micro systems at competitive prices. The drives are fully compatible with Acorn ADFS system. Fan cooled switch mode power supply ensure efficient and reliable operation. Combination of floppy and winchester drives in our elegant plinth housing provides an ideal solution for need to have large storage and ease of transferring data to floppies.

Technomatic front end utility for the Master supplied with the winchesters at no extra cost provides an easy and efficient file management system. The entire contents of the drive are displayed on the screen on boot up, each file or directory appearing as an icon. The icon type indicates whether directory or file and type of data if latter.

Larger capacity drives available on request.

P20HD TECHNOMATIC 20 Mbyte Winchester Drive	**£429(a)**
P30HD 30Mb Winchester Drive	**£449(a)**
P40HD TECHNOMATIC 40 Mbyte Winchester Drive with Acorn ADFS ROM	**£749(a)**
P204HP TECHNOMATIC 20 Mbyte Winchester and a 80T DS floppy Drive built in a monitor stand. Includes ADFS Rom.	**£609(a)**
P2041HT As P204HP but also with a 10 Mbyte tape streamer backup unit and backup utilities. Includes ADFS Rom.	**£1179(a)**
TS10 10 Mbyte Tape Streamer Backup unit with utilities.	**£599(a)**
TFC10 10 Mbyte Pre-formatted Cartridge for use with P2041HT and TS10.	**£19(d)**

Technomatic Winchesters can be adapted to operate with the SJ Research FileServer by internal modification. However this must be specified at the time of ordering otherwise the drive has to be returned to us for modification.

Adaptor for SJ FileServer	**£28**

WINCHESTER Drive Multiplexer
These units let you share a Winchester drive between a number of computers. Full details on request.

TWM2 for two computers.	**£99 (b)**
TWM4 for four Computers.	**£149 (b)**

NEW **Following the great success enjoyed by our P20HD unit, we are pleased to announce the launch of P30HD – a 30Mbyte hard drive. This drive is also supplied with the free front end utility for the Master. £449(a)**

3M FLOPPY DISCS



5.25″ Discs in packs of 10

744	40T SS DD	**£8.20(d)**
745	40T DS DD	**£10(d)**
746	80T SS DD	**£12.25(d)**
747	80T DS DD	**£13.00(d)**

3.5″ Discs in packs of 10

80T SS DD	**£15(d)**
80T DS DD	**£19.50(d)**

(Add £1 for library case packing)

BULK DISCS

50 5.25″ 40 T single sided discs with sleeves in lockable box.	**£25(b)**
50 5.25″ 80 T double sided discs with sleeves in lockable box.	**£32(b)**
50 3.5″ 80T double sided discs with sleeves in lockable box.	**£60(b)**

FLOPPICLENE DRIVE HEAD CLEANING KIT

5.25″ Kit with 20 disposable discs	**£12.50(d)**
3.5″ Kit with 20 disposable discs	**£14.00(d)**

DISC STORAGE BOXES

DB340 Lockable 40 × 3.5″	**£8.50(c)**
DB550 Lockable 50 × 5.25″	**£6.50(c)**
DB570 Lockable 70 × 5.25″	**£8.50(c)**
DB5100 Lockable 100 × 5.25″	**£10.50(c)**

TECHNOMATIC

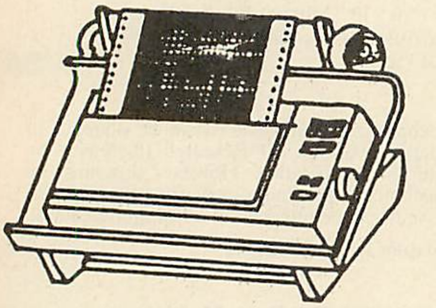
305 Edgware Road, London W2 Tel: 01-723 0233

PRINTERS

EPSON LX800	£189(a)
EPSON FX800	£295(a)
EPSON FX1000	£405(a)
EPSON EX800	£395(a)
EPSON EX1000	£539(a)
Colour option for EX800/EX1000	£59(b)
EPSON LQ850	£439(a)
EPSON LQ1050	£529(a)
TAXAN KP815	£269(a)
TAXAN KP915	£369(a)
NATIONAL PANASONIC KXP1081	£149(a)
STAR NL10 (Parallel Interface)	£179(a)
STAR NL10 (Serial Interface)	£219(a)
INTEGREX Multicolour Inkjet printer	£549(a)
BROTHER HR20	£349(a)
NAT PANASONIC KX P3131 includes massive buffer of 38K	£249(a)
JUKI 6100 Daisy wheel printer	£295(a)
BBC/Master Parallel Printer Lead (1.2m)	£5(d)
BBC/Master Parallel Printer Lead (2m)	£7(d)
Compact Parallel Printer Lead (1.2m)	£9(d)
Archimedes Parallel Printer Lead (2m)	£9(d)

PRINTER STAND

A new style printer stand with easy paper feed and paper seperation, provides complete access to paper. Can be used with both top and bottom paper feed. Very space efficient. **£26 (b)**



MODEMS

All modems listed below will be supplied with a BBC data lead.

MIRACLE WS4000 V21/23	£135(b)
MIRACLE WS3000 V21/23	£244(b)
MIRACLE WS3000 V22	£409(b)
MIRACLE WS3000 V22 bis	£537(b)
(All modems are BABT approved)	
BBC Data Cable for WS3000/4000	£7(d)
MIRACLE WS2000 V21/23 & BELL stds	£92(c)
WS2000 Auto Dial Card	£27(d)
WS2000 Auto Answer Card	£27(d)
S2000 SKI Kit	£5(d)
WS2000 User Port Lead	£5(d)

TIME WARP

Real Time Clock, Plugs into the user port, battery back up as standard, includes manual, demo software including a diary/planner application program **£29(d)**

PLOTTERS

Hitachi 672XD A3 4 Colour HPGL (variety of pens available)	£465(a)
Plotmate A4S	£282(a)
Plotmate A3M	£431(a)

Large Plotters available. Please enquire.

PRINTER SHARERS & BUFFERS

TSB256 Printer Sharer Buffer

Provides a massive buffer size of 256K and connects three computers to one printer. Autoswitching between computers. Facility to print copies. **£189(b)**

BUFFALO PB Buffer

Parallel buffer for internal fitting to most Epson printers. Simple to instal.
PB128 (128K) **£89(c)**

PERIPHERAL & COMPUTER SHARERS

High quality switches to allow the user to switch between computers, printers, modems etc. Fully shielded metal cases, all lines fully switched.

	Parallel		Serial
2 Computers to 1 Printer 36v36-2	£25(c)	25v25-2	£25(c)
3 Computers to 1 Printer 36v36-3	£39(c)	25v25-3	£39(c)
4 Computers to 1 Printer 36v36-4	£45(c)	25v25-4	£45(c)
2 Computers 2 Printers		25v25-x	£49(c)
X-over 36v37-x	£49(c)		
BBC Cable Set 3 to 1 (1m ea)	£24(c)		
BBC Cable Set 4 to 1 (1m ea)	£30(c)		

BBC Computer Sharer: TCS26

1 computer to 2 printers fitted with BBC cable **£21(c)**

Paper & Labels

Plain fanfold paper with microperforation:

2000 sheets 9½ × 11″	£12 (£3.50)
2000 sheets 14½ × 11″	£18.50 (£4.50)
1500 sheets A4 90gsm	£18.00 (£4.00)

Labels/1000

Single Row 3½ × 1⁷⁄₁₆	£5(d)
Triple Row 2⁷⁄₁₆ × 1⁷⁄₁₆	£5(d)

PROGRAMMING ACCESSORIES/SOFTWARE

Compatible with B, B+ and Master

EpromRyter (Epromer II) EpromRyter is compatible with BBC Master only. See page 7.	£89(b)
Upgrade of Epromer II to Eprom Ryter (Please return your Epromer II)	£49(b)
EPROMER II	£89(b)
MPROMER	£49(c)
META ASSEMBLER	£145(b)
PORTAL EPROM EMULATOR 512K	£245(b)
TEAM Disassembler	£145(b)
EPROM ERASERS	
UV1B 6 eproms, safety cutout	£47(b)
UV1T 6 eproms, timer, safety cutout	£59(b)

MONITORS

14″ MONITORS

Microvitec 1431 Std Res	£179(a)
Microvitec 1431AP Std Res + PAL/Aud	£199(a)
Microvitec 1451 Med Res	£225(a)
Microvitec 1451AP Med Res + PAL/Aud	£255(a)
Microvitec 1441 Hi Res	£359(a)
Philips 14″ RGB Med Res, high contrast screen, TTL/Linear Input, Mono/Colour Switch Sound Input. Separate controls for brilliance and contrast. This is the monitor used by Acorn with Archimedes and Compact Computers.	£195(a)

Microvitec 20″ RGB/PAL/ Audio Monitors

Microvitec 2030CS Standard Resolution RGB/Comp Video	£380(a)
Microvitec 2040CS High Resolution RGB/ Comp Video	£675(a)
TAXAN SUPER VISION 620 12″ Hi Res/Hi Contrast Option to switch to green/amber BBC/IBM Compatible	£269(a)
TAXAN SUPER VISION 625 12″ Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible.	£319(a)

12″ MONOCHROME MONITORS

PHILIPS BM 7502 Hi Res green screen	£69(a)
PHILIPS BM7522 Hi Res amber screen	£75(a)
PHILIPS BM 7542 Hi Res Paper White screen	£79(a)

SPECIAL
for this month
Swivel Stand for Philips Mono monitors £6(c)
(if purchased with monitor)

MONITOR ACCESSORIES

Microvitec Swivel Base (14″ plastic monitors)	£17(c)
Monitor Stand Models B & B+	£10(c)
Monitor Stand Master	£13(c)
Double Tier Stand Models B, B+ or Master	£24(b)
Taxan RGB Lead	£5(d)
Microvitec Lead	£3.50(d)
Monochrome BNC/Phono Lead	£3.50(d)

TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177

CAD/DRAWING PACKAGES

NOVACAD
Cad Package for B, B & MASTER.
(See page 5 for specification)

Tracker Ball/Mouse Version (TM)	£49 (d)
TM Version plus Tracker Ball	£94 (d)
TM Version plus Mouse	£79 (d)
Plotter Driver Generator	£15 (d)

MOUSE

AMX MOUSE with SUPER ART (pse specify B, B+ or Master)	£59 (d)
STOP PRESS (Pagemaker)	£32 (d)
EXTRA/EXTRA (utility for the Pagemaker)	£19 (d)
MAX	£17 (d)
STAND ALONE MOUSE (includes horizontal scroll lock)	£34 (c)

RB2 TRACKER BALL

RB2 Tracker Ball with Icon Master (for B, B+ & Master)	£59 (c)
RB2 Tracker Ball with Cursor Control Rom (for Master only)	£59 (c)
RB2 Tracker Ball 'Stand Alone' for use with NOVACAD & other software)	£47 (c)
Cursor Control Rom for Master	£12.50 (d)
MIRRORSOFT FLEET STREET EDITOR	£35 (d)

CP/M SOFTWARE

Please send for details on our range of CP/M software for Acorn/Torch Z80 2nd Processors

BBC SOFT/FIRMWARE

DATABASE MANAGEMENT SYSTEMS

VIEWSTORE	£37 (d)
STARdataBASE	£39 (d)
MASTERFILE II	£17 (d)
ACORN OVERVIEW PACKAGE Special Offer (RRP £86)	£69 (b)

WORD PROCESSORS

ACORN VIEW PROFESSIONAL (BBC)	£75 (c)
VIEW 2.1	£35 (d)
VIEW 3.0	£48 (c)
VIEW INDEX	£12 (d)
VIEW PRINTER DRIVER GENERATOR	£7 (d)
VIEWSPELL	£29 (d)
DOT PRINT PLUS	£28 (d)
WORDWISE	£24 (d)
WORDWISE PLUS	£38 (d)
WYSIWYG PLUS	£21 (d)
SPELLMASTER	£47 (d)
INTERWORD	£39 (d)
WORDEASE	£24 (d)
SPELLCHECK III	£31 (d)
EDWORD II	£43 (c)

SPREADSHEETS

VIEWSHEET	£37 (d)
WINDOWMATIC	£15 (d)
VIEWPLOT	£22 (d)
INTERSHEET	£37 (d)
INTERCHART	£26 (d)
ULTRACALC	£26 (d)
MINI OFFICE II DISC Version	
For B & B+ 40T or 80T	£14.75 (d)
For Master 80T	£17.30 (d)
For Compact	£19 (d)
MINI OFFICE II ROM Version	
For Master, Compact, B+ & B	£48 (c)
MEGA 3Rom	£82(b)

CC's integrated package offering Interword, Intersheet & Interchart on one 128K ROM. For Master, Compact, B+ & B

LANGUAGES

META ASSEMBLER	£145 (b)
TEAM DISASSEMBLER	£145 (b)
MACROM	£33 (d)
ACORN MICRO PROLOG	£62 (d)
ISO-PASCAL	£51 (c)
ISO-PASCAL STAND ALONE GENERATOR	£30 (d)
OXFORD PASCAL (40 or 80T) Specify B or B+	£36 (d)
OXFORD PASCAL for Master	£52 (d)
ACORN LOGO	£46 (c)
LOGOTRON LOGO	£55 (c)
BBC PUBLICATIONS OPEN LOGO	£59 (c)
ACORN LISP ROM	£39 (d)
ACORN FORTH ROM	£39 (d)
ACORN COMAL ROM	£39 (d)
MICROTEXT	£52 (c)
MICROTEXT PLUS	£229 (b)

COMMUNICATIONS

TERMULATOR	£25 (d)
COMMSTAR II	£28 (d)
MAYA Comms Package See next page for details	£49
MODEM MASTER	£11 (d)
COMMAND	£34 (d)
MASTER TERMULATOR	£34.75 (d)

UTILITIES

ACORN BASIC EDITOR	£24 (d)
MONITOR (BBC Pub)	£19 (d)
SLEUTH	£23 (d)
TOOLKIT PLUS	£31 (d)
TOOLBOX 2 (BBC Pub) Manual	£9.50 (d)
Cassette	£9 (d)
ACORN GXR GRAPHICS ROM specify B or B+	£24(d)
PRINTMASTER	£24 (d)
PRINTWISE	£24 (d)
DUMPMASTER	£26 (d)
FONTWISE PLUS	£17 (d)
ADV TELETEXT UTILITIES ROM	£7.95 (d)

COMPACT (all on 3½" disc)

ARTROOM	£27 (d)
FONTWISE+	£22 (d)
FONT EDITOR	£22 (d)
BETABASE	£27 (d)

WHITE KNIGHT MKII	£16 (d)
BBC PUBLICATIONS BUNDLED SOFTWARE	£18.50 (d)

BBC PUBLICATIONS EDUCATIONAL SOFTWARE

A series of programs developed in many cases alongside Radio & TV programmes by BBC's Education Department which supplement the classroom studies by moving and colourful displays helping in clear understanding of a variety of subjects. Some packages also include audio cassettes.

PRIMARY EDUCATION

ASTRONOMY	£11 (d)
COMPUTERS AT WORK	Aud/EC/disc£16 (c)
PICTURE CRAFT	Disc£17 (d)
INTRODUCING GEOGRAPHY	Disc£16 (d)
MATHS WITH A STORY 1	Cass£8 (d)
MATHS WITH A STORY 2	Cass£8 (d)
NUMBER GAMES	Cass/EC£7.50 (d)
USING YOUR COMPUTER	Cass£24 (c)

SECONDARY LEARNING

TECHNOLOGY & DESIGN Pt1	£21.50 (c)
ELECTRIC FIELDS	£10.50 (d)
ADVANCED LEVEL STUDIES: STATISITICS	Disc£23 (d)
ADVANCED STUDIES: GEOGRAPHY	Cass£10 (d)
INSIDE INFORMATION	Prog Cass£10 (d)
Book£8 (d)	Audio Cass£5 (d)
SCIENCE TOPICS (ST)	
S.T.:WAVES	Disc£14 (d)
S.T.:RELATIONSHIPS	Disc£14 (d)
S.T.:BONDING	Disc£14 (d)
S.T.:ELECTROMAGNETIC SPECTRUM	(d)
S.T.:ELECTRONICS IN ACTION	Disc£14 (d)
S.T.:NEWTON & THE SHUTTLE	Disc£19 (d)
S.T.:ECOLOGY	Disc/EC£19 (d)
S.T.:POLYMERS	Disc/EC£19 (d)
S.T.:CLASSIFICATION & PERIODIC TABLE	Disc£20 (d)
S.T.:FOOD & POPULATION	Disc£20 (d)
SEC.SCIENCE MICROTECHNOLOGY	Cass£7 (d)
SEC.SCIENCE:THE MOLE CONCEPT	Disc/Aud/EC£16 (c)

GENERAL

VU-TYPE PROFESSIONAL	Disc£19 (d)
WHITE KNIGHT MK II (for 1770 DFS)	Disc£16 (d)
BATTLEFIELDS	Cass£8.50 (d)
A VOUS LA FRANCE	Cass/EC£17 (d)
	Book£5.25 (d)
	Audio Cassettes (2) £7.50 (a)
Additional charges for discs	£9.00 (d)
DEUTSCH DIREKT	Disc/aud/EC£16 (c)
	Book£5.95 (d)

BLACK QUEEN
A long awaited bridge game. (1770DFS) £13(d)

BISMARCK
History of the famous battleship. (1770DFS) £13(d)

Cassette based programs listed above can be supplied on disc at an extra charge of £1.50 per disc and please specify the format required 40 or 80T.

TECHNOMATIC

305 Edgware Road, London W2 Tel: 01-723 0233

BOOKS

No VAT Carriage Code (c)

LANGUAGES

- 6502 Assy Lang Prog £19.95
- 6502 Programming £13.95
- 8086 Book £23.95
- Acorn BCPI User Guide £15.00
- Acorn FORTH £7.50
- Acorn LISP £7.50
- Acorn ISO Pascal Ref Manual £10.00
- Intro to COMAL £10.00
- Intro to LOGO £7.50
- Micro Prolog Ref Manual £10.00
- Introduction to Turbo Pascal £14.95
- Prog the Micro with Pascal £8.50
- The Supervisor's BBC Micro £10.95

BBC MICRO GUIDE BOOKS

- Inside Information £8.95
- Maths Prog in BBC Basic £7.95
- The Friendly Computer Book £4.50
- Toolbox 2 .... £10.95

ARCHIMEDES

- Archimedes Reference Manual .... £29.95(b)
- ARM Assembly Language Prog .... £12.95(b)

PROGRAMMING/UTILITY

- Advanced Sideways Ram User Guide £9.95
- Advanced User Guide (BBC) £15.95
- Applied Assembly Language on the BBC ... £9.95
- BBC Micro Advance Programming £9.95
- BBC Micro Ref Guide (B Smith) £10.95
- BBC Micro Sideways ROM's RAM's £9.95
- Guide to the BBC Rom £9.95
- Beginners Guide to W.P. £7.95
- Mastering Assembly Code £8.95
- **Mastering Interpreters & Compilers £14.95**
- **Master Operating System £12.95**
- **Mastering View, Viewsheet & Viewstore £12.95**
- **View by B. Smith £12.95**
- View 3.0 User Guide £9.00
- Viewstore User Guide £9.00
- Viewsheet User Guide £9.00
- Wordwise Plus £9.95

SOUND & GRAPHICS

- Computer Graphics & CAD Fundementals .£9.95
- Mastering Music £6.95

DISC DRIVE SYSTEMS

- Advanced Disc User Guide £16.95
- Disc Book £3.50
- Disc Programming Techniques £7.95
- Disc Systems £6.95
- File Handling on the BBC £6.95
- Discovering Disc Drives .... £POA
- Practical Disc File Techniques £5.95
- Mastering the Disc Drive £12.95
- Mastering DOS plus £12.95

APPLICATIONS

- Interfacing Proj for BBC £6.95
- BBC and Small Business £5.75
- The Software Business £5.50

Mastering Operating System
(David Atherton) £6.95

WYSIWYG PLUS

WYSIWYG PLUS is a printer and screen utility for Wordwise Plus, View, Interword, and Basic users, supplied on a 16K Eprom. To obtain a particular printer effect, such as enlarged text, it used to be necessary to discover the appropriate 'printer control code' from your manual and incorporate it into your text. Secondly, you had to print several trial copies in order to position the effect correctly in relation to the rest of your text.

WYSIWYG PLUS simplifies this trial and error approach using easily remembered *commands. For example, *ENLARGED not only selects enlarged text on your printer, but uniquely shows you double width characters on your screen, even from within Wordwise Plus!

WYSIWYG PLUS incorporates a logo editor. Just draw your design on screen using the arrow keys, and save the results. Use the *GRAPHICS command to incorporate your design anywhere in your text; position and see your design in your text before faithfully reproducing a hard copy.

There is also special help for daisy wheel users. The *WHEEL command will prompt you to change daisy wheels whenever a change in type style is about to occur.

WYSIWYG PLUS is designed to work with the following systems:

BBC Model B	6502 Second Processor,	BBC Master 128	All printers (Except lasers)
BBC Model B+	Turbo coprocessor	BBC Compact	

WYSIWYG PLUS workspace is relocatable.

MAYA TERMINAL EMULATOR

A comms package for the professional user. MAYA emulates DEC VT52, VT100 and Tandberg TDV2215. Special BBC VDU mode allows full access to the BBC VDU driver.

Menu driven software allows the setting up of parameters and function key definitions which can be saved to disc for future use.

Flexible command parser provides a uniform user interface and allows full access to * commands and HELP facilities.

Xmodem and Kermit file transfer protocols are included as standard. Unique feature of MAYA is that Kermit can also be used in 'remote mode', which allows file transfers to be initiated by other computers connected to the BBC. File transfers can also be done with a 'dumb' ASCII protocol. Open architecture allows for expansion and addition of new features. Options currently under development are graphics drivers for Tektronix 4010/4014 emulation, TDGR driver for TDV2215 and a Viewdata patch (provisional version included in the current issue). Registered users will be provided with regular updates and customisation service will also be available to those interested.

The package comprises of a rom, utils disc and a comprehensive manual. It is compatible with Master, Models B & B+. It supports DFS, ADFS, NFS and ANFS filing systems.

BLACK QUEEN

A contract bridge program from BBC Publications both for beginners and for club players. Features include rebid and/or reply of any deal just played. Deals can be saved to a disc. Unique feature of Black Queen is its ability to construct deals from standard or classic ones in newspapers etc.

Compatible with Master, B and B+ **£13(d)**

EDUCATIONAL/FUN SOFTWARE BUNDLE

Wordmover		Drawstick
Wordplay	Pantry Antics	Locomotion

These programs are supplied from the BBC Publications Educational Software range and will be supplied on a 5.25" disc for BBC Master, B+ and B and on a 3.5" disc for the Compact.

5.25" Disc £17.50(d)
3.5" Disc £18.50(d)
(Normal RRP over £40)

VU-TYPE

Do you have finger trouble when typing?
Do your letters look like this?

Dear Sor,
I wuold like to...

then you need:

VU-type, a complete touch typing program produced by BBC/Pitman.

It allows you to learn at your own pace and has a wide range of exercises. Screen displays show the keys you have pressed and it will report on your speed and accuracy.

Supplied on a 40T Disc with a manual.

Available at a special price of £7.50(d) instead of the usual £15. Offer valid while stocks last.

BISMARCK

An enthralling game of strategy involving the famous German battleship of the same name.

You can play the role of British Navy in its quest to find the Bismarck and sink it or take either British or German role against another player. It requires the highest qualities of judgement, observation and decision to plan strategy and tactics to plot the death of Bismarck. **£13(d)**

PRINTER ACCESSORIES

EPSON ACCESSORIES:

Interfaces

- **8143** RS232 .... £30 (d)
- **8148** + RS232 + 8k .... £65 (d)
- **8177P** NLQ for FX80 +/FX100 + .. £99 (d)

Parallel & Serial Buffers of various size also available.

- **LQ800** Tractor Feed .... £47 (b)
- **LQ1000** Tractor Feed .... £52 (b)

SHEET FEEDERS:

- **LQ800** .... £135 (b)
- **LQ1000** .... £179 (b)
- **EX800** .... £135 (b)
- **EX1000** .... £309 (b)
- **FX800** .... £135 (b)
- **FX1000** .... £179 (b)

Ribbons:

- RX/FX100/100 +, FX105 .... £7 (d)
- RX/FX80/80 +, FX85 .... £4 (d)
- LX80/LX800 .... £4.50 (d)
- LQ800 .... £8.50 (d)
- LQ1000 .... £10 (d)
- EX800/1000 .... £7.50 (d)
- H180 Pen Set (Aqueous/Ball point) .... £8.25 (d)

HITACHI 672 Plotter

- Aqueous Pen Set six pens .... £18.50 (d)
- Oil Based Pen Set six pens ... £25.00 (d)

TAXAN CANON Accessories:

- Ribbon, KP810/815/910/915 ...... £6 (d)

Star Printer

- NL10 Sheet Feeder .... £52 (b)
- NL10 Ribbon .... £4.50 (d)

National Panasonic KX P1080/81

- Spare Ribbon .... £4.50 (d)
- KXP3131 Tractor .... £90 (a)
- KXP3131 Sheet Feeder .... £189 (a)

JUKI 6100

- Tractor Feed .... £149 (a)
- Ribbon (Carbon) .... £2.00 (d)
- Sheet Feeder .... £219 (a)

BROTHER HR20

- Tractor Feed .... £116 (a)
- Spare Ribbon Nylon .... £3.00 (d)
- Spare Ribbon Carbon .... £4.50(d)

INTEGREX INK JET COLOUR PRINTER

- Spare Ink Cartridge Black .... £9 (d)
- Spare Ink Cartridge Colour ...... £15 (d)
- Paper Roll .... £7 (d)

Printer Leads:

- BBC Parallel Lead (1.2m) .... £6 (d)

PAPER & LABELS

Plain Fanfold paper with micro perforations:

- 2000 sheets 9½" × 11" 60 gsm/sq m .. £12 (£3.50)
- 2000 sheets 14½" × 11" 60 gsm/sq m £18.50 (£4.50)
- 1500 sheets A4 90 gsm £18 (£3.50)

Labels/1000:

- Single Row 3½ × 1 7/16" .... £5.25 (d)
- Triple Row 2 7/16" × 1 7/16 .... £5 (d)

TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177

NOVACAD

Computer Aided Draughting for the BBC Micro

"Novacad can drive a plotter to provide drawings of a high quality... Novacad is excellent. It is flexible, genuinely easy to operate without much practice, and a pleasure to use." **Beebug December 1986**

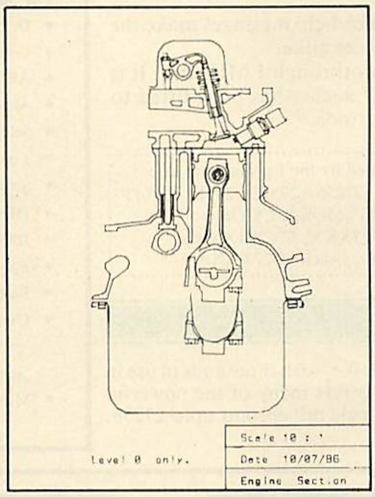
"Novacad is a professional package, well worth the £90 for the ROM and disc and is expandable to suit your own particular requirements. I would have no reservations if I heard Novacad called, "the best on the market"." **A&B Computing August 1986**

A sophisticated CAD package with unique facilities which are generally confined to the professional CAD packages costing thousands of pounds.

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NOVACAD'S MAJOR FEATURES

* Simple and easy to use with logical command sequence.
* A large drawing area (approx 15 screens).
* The ability to create complex icons (upto 500 lines instead of the usual 15 to 20 pixels), store them in a library and recall them at different scales and orientations.
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* Block copy of shapes on the screen for repetitive use.
* Text entry at any 90° orientation at any position on the screen.
* Create multi layer drawing with 8 levels available.
* Full compatibility with the BBC range with minimal hardware requirements yet having the capability of exploiting the potential of the extra shadow memory or the second processor's memory and speed.
* Printer routine for Epson 80 and 136 column printers.
* A unique optional facility to output to any BBC compatible plotter.
* Cursor control from keyboard, tracker ball or mouse.



NOVACAD is compatible with all BBC models fitted with Acorn DFS. It has minimum hardware requirements of a single drive and a Epson compatible printer to get started though NOVACAD will utilise fully a dual drive system and 6502 2nd processor or the shadow ram on the B+ series. To obtain high quality drawings we recommend a BBC compatible plotter and our plotter driver generator.

With basic BBC B, NOVACAD operates in mode 4 allowing use of any 2 colours. With shadow memory of the BBC+ or the Master, it can also operate in mode 0 for higher resolution or mode 1 for allowing use of any 4 colours, and it will provide additional user memory for more complex drawings.

6502 second processor or the Turbo on the Master will also increase the drawing speed considerably.

NEW REDUCED PRICE

£49(d)

Plotter Driver Generator £15(d)

OPTIONAL EXTRAS

Plotter driver generator is available as an optional extra to configure a plotter routine for any BBC compatible plotter. Pre-configured programs for the popular plotters like **Epson HI 80, Hitachi 672, Plotmate, Penman** and **HP GL.** This program allows the drawing to be scaled to the maximum plotter size thus enabling drawing of A2 and A3 sizes to be produced with equal ease. The zoom facility will enable inaccuracies of drawing on the screen to be eliminated.

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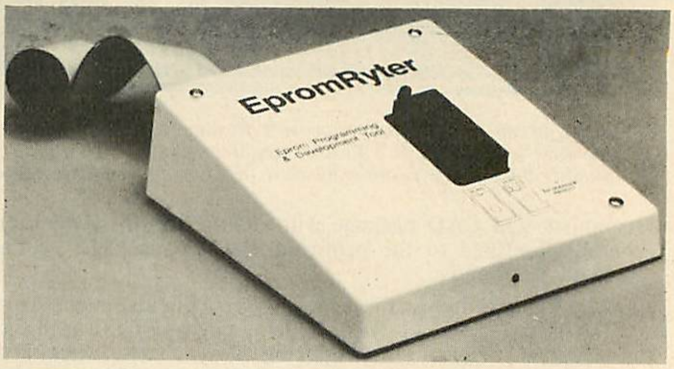
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***Handles all current single rail Eproms**
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NEW LOW PRICE £89 + VAT

The single rail eproms handled by the EpromRyter are:
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- One time eproms P27XXX, 87CXXX etc.
- Also A suffix eproms such as 27XXXA

The main features of the programming software are:

* Device, function and voltage selection from the computer keyboard.
* Continuous display of the options selected.
* All eproms upto 27512 (64K) programmed in single pass.
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* Block move of data within the address range.
* User can select any section of the eprom from single byte to the full address range to blank check/burn/verify. Facility to program single bytes makes program development/amendment simpler.
* Multiple loading for ROM Filing System

Some of the above features apply to Master Computers only

EPROMER II

A proven Eprom programmer for BBC Model B and B+ with thousands in use in industry, educational and R&D establishments. It offers many of the powerful features of the EpromRyter and can program all single rail eproms upto 27256. Full details on request.

META Version III

"All the good features you would expect to find in a good source code editor are present . . . Meta assembler lives in a different world. It is structured to work with any new processor . . . as new instruction sets can be added . . . as needed . . . has a well featured editor with colour highlighting, a sound modular approach." **Acorn User October 1986**

- Assembles for over 30 popular processors, including Z80, 6800/01/02/04/05/09/11 etc — and 68000 — using native mnemonics for each processor, eg. LD A, (HL) for Z80 and MOV AO, $1000 for 68000 etc.
- Fully integrated Editor: four field, all search, search/replace, block copy, delete, move, marked save, load etc.
- Compatible with Portal Eprom Emulators and Team Disassemblers.
- Send object code in Intel Hex, S-Record, straight binary etc. down to discs, RS232, parallel port, Eprom Emulators etc — all **during Assembly.**
- Over 50 directives included as standard: handling nestable macros, conditional assembly and twenty types of table definition directives.
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- Modular source code with numeric and string parameter passing.
- Serial communicator area with eight options lines: echo, control code trap, LF supression/addition etc.
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- Two 16K Roms, two 80 track discs, A4 ring-band manual, function-key strip.

PORTAL EPROM EMULATORS

- Emulates 2716, 2732, 2764, 27128, 27256, 27512 eproms at 150ns Access time.
- Load at 4Kbytes/second — No "erase" time.
- 28 pin header plugs into Eprom socket on target system — status monitored on 13 Leds.
- Fully software controlled from Meta Assembler.
- 100 times faster than standard EPROM program/erase cycle.
- Fully CMOS compatible; draws no power from target system.
- Four portals may be independently programmed off same user-post cable.
- Complete with all cables, manual and disc.

PORTAL 512 (2716, 2732, 2764, 27128, 27256, 27512).

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The third part of the Universal Development System: a Meta labelling dissassembler.

Supports 1802, 8080, 8085, HD64180, Z80, 65XX (includes 65 col, 6511 etc), 68XX (includes 00, 01, 02, 03, 08 etc):

- Up to 64K of object code translated back into META compatible source code modules: labels automatically inserted on all jump targets, memory references etc.
- Pre-editing stage allows marking of object code areas as byte, string, word, long word etc, tables. These areas dis-assembled into appropriate directives instead of garbage mnemonics.
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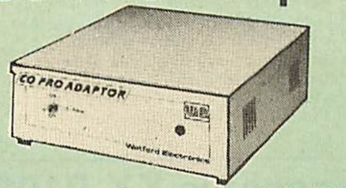
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To use other co-processors you require a BBC B with DNFS 1.20 or higher, or BBC B+ fitted with 1770 DFS 2.20 or greater. Co-processors work exactly like a second processor.
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The 80186 Co-Processor

This package consists of the Master 512 board, Watford Co-Pro Adaptor, 1770 Disc Upgrade and Acorn ADFS. The Master 512 board using the 80186 16 bit Processor at 10MHz and running Digital Research DOS Plus, gives a high degree of IBM compatibility at an extremely reasonable price. Included in the 512k package is a mouse and the amazing Digital Research GEM suite of software; GEM Paint, GEM draw and GEM desktop giving a complete Mouse Icons environment (All other GEM packages will work on the 512k). Famous packages that will work with the 512k board include Wordstar, Dbase II, Lotus 123 and many others. The only requirement to upgrade any BBC Model B to this system is you must have twin 80 track disc drives.

£259

65C102 2nd PROCESSOR

This amazing package consists of the Acorn 65C102 'Turbo' Board, the Watford Co-Pro Adaptor and Acorn 1.2 DNFS ROM. The 'Turbo' board, running at 4MHz with 64k of additional RAM will increase the speed by between 50 and 200% depending on the application running, and allow a BASIC program of upto 44k in any screen mode. Simply by plugging in the Co-Pro and the DNFS ROM with its special Tube host code and you massively increase the power of any Model B.

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Z88 Sinclair's Portable Micro

Watford Electronics announce a very special new – and affordable portable microcomputer, tailor-made for the BBC Micro user on the move – the Cambridge Z88.

The Cambridge Z88 is a versatile portable micro, bursting at the seams with built-in software ready and waiting for you to use at the push of a button. There is BBC BASIC, a word processor, a database, a terminal, a filer a diary and a calculator, all integrated and all inclusive!

The Cambridge Z88 uses just four AA batteries, and from this it will store all of your programs and files on a built-in RAM disc, so there are no cassettes to worry about or discs to lose.

The LCD display is particularly impressive, using state of the art Supertwist technology, the display is sharp at all times, and clear under even the worst lighting conditions.

The word processor is based on Acorn's View package; View is the most popular word processor available for the BBC Micro, and files and programs written on the Z88 can be transferred to and from the BBC Micro with consummate ease.

The Pipedream word processor is possible the single most powerful package written for a portable yet! Being an integrated Spreadsheet and word processor you can combine text and numbers to create stunning reports, timetables or simply letters in a variety of column widths (up to 80 column) and numeric data can be freely sorted searched and calculated INSIDE a text file – a feature only previously available on much more expensive software packages running on large machines.

Nearly all of the 32K memory is available as the RAM Disk, although additional memory packs of 128K are also available, just plug them into the machine (no soldering – no screwing) and you have four times the memory you had before, all of which is available to the Word Processor.

Connecting the Z88 to the BBC Micro is easy; by plugging in the RS232 cable from the Z88 into the RS423 socket in the back of the BBC Micro, a data exchange as fast as 19200 baud is achieved, making the Z88 a fast machine for data transfer.

Custom software is available for the BBC Micro enabling automatic transfer of files to and from the Z88 with automatic conversion and full error checking. The connecting lead plugs straight into the back of the BBC Micro and into the side of the Z88 to form a reliable data link faster than some disc drives!

The Z88 is rugged, reliable, lightweight and compact. It is considerably lighter than all other portable computers currently available, and because it doesn't need disc drives, it is more reliable than any PC "laptop" portables making it especially useful to the BBC Micro owner away from work or home.

Here's what A&B Computing had to say about the Z88:

"The Z88 is an especially worthy machine to have on the move because the files it creates in Pipedream are directly compatible with View Professional... you can write a full report using all of the facilities of Pipedream, port it across using the BBC link software and load it into View Professional".

"The Z88 is surprisingly easy to connect to the outside world – it simply has oodles of RAM disc (up to three megabytes) which can be plugged into the machine".

Need we say more? The Cambridge Z88 – a very special computer. Our Managing Director liked it so much that he uses one constantly.

Price: **£249** (carr £3)

FREE

As an introductory offer, we are giving away, 4 rechargeable batteries and a compact Mains Battery Charger absolutely FREE with every Z88 bought from us this month.

ACCESSORIES

Mains Adaptor	**£8.65**
32K RAM Pack or 32K EPROM Pack	**£17.35**
128K RAM Pack or 128K EPROM Pack	**£43.40**
Z88 BBC or PC Link	**£21.70**
Z88 EPROM ERASER	**£34.75**
Serial Printer Cable	**£8.65**
Parallel Printer Cable	**£24.00**
Z88 Modem	**£86.90**

Continued →



We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop. **All Monitors are supplied complete with BBC connecting leads FREE.**

MICROVITEC 14"

- 1431 – Standard resolution as used on the BBC television computer programme £175
- 1451 – Medium resolution, suitable for word processing in mode 0 £225
- 1441 – High res, exceeds the capabilities of the BBC micro £359
- 1431AP RGB + PAL and AUDIO £199
- 1451AP RGB + PAL and AUDIO £255
- **2030 CS 20" Med Res £380**
- **2040 CS 20" Hi Res £675**
- Dust Cover for Microvitecs £5.50
- Touchtec 501 Touch Screen £239

TAXAN 12/14"

- **TAXAN Super Vision 2 Type 620** Hi-res RGB Colour monitor. Ideal for Wordprocessing £269
- **TAXAN Super 3, Type 625** Ultra Hi-res, RGB Colour) Text mode switch allows monochrome text display in Green, Amber, White reverse or White on Blue £319
- **TAXAN 14" Multisync 770 Plus** – An autoscanning Ultra high res, colour monitor. Ideal for Archimedes £449
- Philips BM7542 12" Paper White Monitor. Attractively finished high res monitor. Has an etched glass anti-glare screen and a tilt stand for optimum viewing angle. 1000 x 850 pixels resolution coupled with high contrast makes it ideal for both word pro and graphics. The paper white display is ideal for DTP and CAD. Has a Video/Audio input. Only £65

STAR BUY

- **PHILLIPS 14"** Hi-Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono Inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display.

ONLY £195

ZENITH

"Now Test Bureau Recommended for use in Education"

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. (These are the same professional quality, stylishly finished monitors as used in the larger Zenith PC Sys.)

Green (New Design) Hi-resolution	£66
Amber (New Design) Hi-resolution	£70

N.B. carriage on Monitors **£7** (securicor)

SPARE LEADS

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3

SWIVEL BASES

for Video Monitors

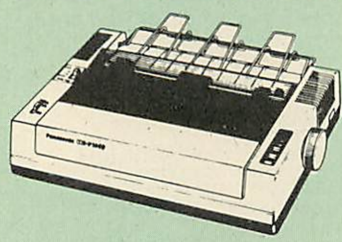
Our professional type swivel bases have front adjustable control. This alleviates the need to lift the monitor when adjusting the viewing angle.

for 12" Monitors **£10** (carr. £2.50)
for 14" Monitors **£14** (carr. £2.50)

Anti-Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for all wordprocessor users. Hundreds of these screens are in daily use in various branches of one of the leading High Street banks. **£12**

Panasonic KX-P1081



Available NOW at a superbly realistic price, the KX-P1081 perfectly balances features, quality of construction and Value for Money to produce the printer of tomorrow, here today, ready to sweep the current generation of machines away.

Ingenious innovation in terms of software control codes permits great flexibility when it comes to defining the print style. A nippy **120 cps** of clear Draft text backs up the crisp 24 cps Near Letter Quality text mode, with upto 40 superbly useful downloadable characters. A delightful range of assorted character widths is efficiently supported, with sizes ranging from a broad 5 cpi to petite 17 cpi, EVEN in NLQ mode. Some of the extensive support for serious use includes specialised functions to perform justification, centering and even left and right ranging. Proportional spacing permit even greater freedom when it comes to advanced use. Not only is the full Epson RX compatible control code set implemented, but extra codes have also been added to cater for the NLQ options, etc.

A full 96 ASCII character set is supported, with an extended set of 32 international characters and IBM special characters as well as IBM block graphics characters. A 1K Print Buffer alleviates much of the wait time normally associated with printing, whilst the bi-directional logic seeking print head takes the quickest route to print as required.

(Price inludes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).

Special Price: **£149** (carr. £6)
Optional RS232 Interface: £39

Panasonic KX-P1082

To complement the hugely popular KX-P1081, WE are proud to announce the launch of Panasonic KX-P1082. This superb Letter Quality printer incorporates all the features of the KX-P1081, plus a draft speed of 160 CPS, (40 CPS in NLQ mode). Ideal for high through-put users. This is a similar speed to the Epson LX800, but has an in-built adjustable tractor feed as standard and the price is way below the price of its nearest rival.

(Our LOW price also includes £35 worth of FREE BBC Cable and Dump Out 3 ROM).

Introductory Offer: **£175** (carr. £7)

Panasonic KX-P3131 Daisy-Wheel Printer

This low-cost high-performance Daisy Wheel printer is ideal for anyone wishing to produce clear, immaculate letters or reports. It delivers, flawless text at 10, 12 & 15 CPS. Supports proportional spacing. Is Bi-directional, logic seeking. Printing speed: 17CPS. Has 6k printer Buffer. A printer of similar spec could cost a lot more than our ridiculously low price of:

Only **£239** (carr. £7)

Single Sheet Feeder	£175
Tractor Feed	£90

FREE 32K extra Printer Buffer with every KX-P3131 purchased from us this month.

VARIOUS PRINTERS & ACCESSORIES

- Brother HR15 RS232 Daisy Wheel **£275**
- Brother HR20 Daisy Wheel **£349**
- Epson EX800 Printer **£399**
- Epson EX1000 Printer **£545**
- Epson FX800 Printer **£295**
- Epson FX1000 Printer **£405**
- Epson LQ800 Printer **£358**
- Epson LQ1000 Printer **£529**
- Epson LQ2500 Printer **£790**
- Epson LX800 Printer **£180**
- Epson SQ2500 Printer **£899**
- Epson Paper Roll Holder **£17**
- EX800/1000 Colour Option **£55**
- EX800/1000 Colour Ribbon **£18**
- EX800 Cut Sheet Feeder **£130**
- EX1000 Cut Sheet Feeder **£195**
- FX/LQ/LX800 Single Sheet Feeder **£135**
- FX/LQ1000 Single Sheet Feeder **£169**
- Hi-80 Refills – Set of 4 Pens **£7**
- LX800 Cut Sheet Feeder **£75**
- LQ800 Tractor Feed **£44**
- LQ1000 Tractor Feed **£50**
- LQ2500 Cut Sheet Feeder **£195**
- LX1000 Cut Sheet Feeder **£305**
- **Hitachi 672 Colour Plotter £475**

(Securicor Carriage on Printers £7

EPSON PRINTER INTERFACES

All these interfaces fit inside the printer.

RS232	**£27**	RS232 + 2K Buffer	**£52**
IEEE 488	**£65**	RS232 + 8K Buffer	**£62**

KAGA/TAXAN PRINTERS

(IBM/Epson compatibles)

Kaga KP815 Printer	**£269** (carr £7)
Kaga KP915 Printer	**£350** (carr £7)
RS232 Interface	**£49**
RS232 Interface with 2K Buffer	**£69**
RS232 Interface with 16K Buffer	**£89**

INTEGREX COLOUR JET PRINTER

- Colour Jet 132 Printer **£525**
- Paper Roll **£6**
- Screen Dump Software **£10**
- Colour Cartridge **£14**
- Black Cartridge **£8**
- 100 A4 OHP transparencies **£55**

PRINTER SHARERS

(Ideal for School environment)

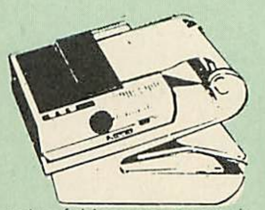
Connects	Serial	Centronics
2 BBC Micros to 1 Printer	£25	£27
3 BBC Micros to 1 Printer	£36	£35
6 BBC Micros to 1 Printer	–	£99

PRINTER CHANGER

3 Printers to 1 Micro (Centronics) **£65**

(Cables extra, specify type required when ordering)

Professional Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

£26 (carr. £2.50)

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible Printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from BASIC and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

PRINTER LEADS

Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA, Panasonic etc. printers.

Standard length (4 feet long)	£6
Extra long (6 feet long)	£8
Compact's Special Centronics Lead	£9
RS232 Cable	P.O.A.
IBM Parallel 1 metre Cable	£9

PRINTER RIBBONS & VARIOUS DUST COVERS

Type	Ribbons	Dust Covers
BBC Micro	–	£3.50
BBC Master	–	£4.00
Brother HR15/20	£3.00	£5.00
EX/LQ800	£7.50	£4.50
EX/LQ1000	£8.00	£5.00
RX/FX80/85/800/MX80	£4.00	£4.95
RX/FX100/1000	£7.00	–
Kaga/Texan KP810/815	£5.25	£4.00
LQ2500	£9.00	£5.50
LX80/86/800	£4.00	£4.50
M1009/GLP	£4.00	£3.75
Panasonic KX1080/81	£4.50	£4.75
SQ2500	£25.00	£5.50
Star NL10	£4.00	£4.50
Microvitec Metal	–	£5.50

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Listing Paper (Perforated)

1,000 Sheets 9½" × 11" Fanfold Paper	£7
2,000 Sheets 9½" × 11" Fanfold Paper	£12
1,000 Sheets 15" × 11" Fanfold Paper	£9
1000 Sheets true A4 Fanfold Paper	£11
2000 Sheets true A4 Fanfold Paper	£20
Teleprinter Roll (Econo paper)	£4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50. 2K Sheets £3.00

PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 × 36mm (Single Row)	£5.00
1,000 90 × 36mm (Twin Row)	£4.90
1,000 90 × 49mm (Twin Row)	£7.50
1,000 102 × 36mm (Twin Row)	£6.25

Carriage on 1,000 Labels £1.00

MEGABUFFER 256



This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. It allows the computer to print 256,000 character in a short time thus freeing the computer very quickly. In short it makes light work of printing large documents, screen dumps, etc. It is extremely simple to connect. The features are:

- Low Cost, High performance.
- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

In conclusion it can safely be said that MEGABUFFER 256 is the ultimate printer Buffer for both the amateur and professional user.

Only £125 (carr £2)

OFFICE MASTER



CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

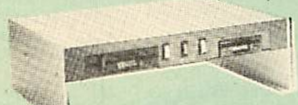
DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features.

BEEBPLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

New Launch Offers
Disc Drives DP35-800S



A Double disc drive – with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master Series is the 5.25 inch disk, the standard for the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S, it contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

The 5.25 inch disk drive is 40/80 track switchable, and has its very own power supply running independently of the BBC Micro.

Watford's new plinth enables users to read, write and format disks both in DFS and ADFS format – currently the accepted standard for the Master Compact and the Archimedes, it also enables the user to read disks written for the Archimedes. Ideal for both BBC & Master.

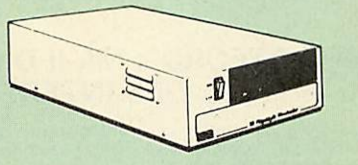
Launch Offer: **£165** (carr. £7)

CSPM 400/S DISC DRIVE

A single (1 Megabyte unformatted), double sided, 40/80 track switchable 5¼" disc drive mounted in a BBC Master Plinth (same as DP35-800S) but with a blanking plate to add a second disc drive at a later date. The in-built Power Supply is capable of running two disc drives. The unit is supplied complete with cables and a utilities disc.

Launch Offer: **£139** (carr. £7)

30 Megabyte Winchester Drive



Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.

This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a full user guide and full utilities including file copy, 1000K save routines, Format and Verify – in fact all you need and more.

Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along wqith a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!

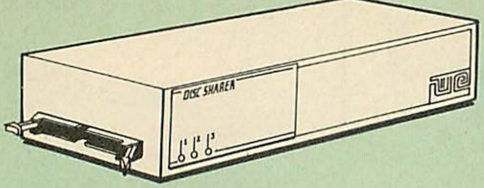
Compatible with the Master, and the BBC B (with 1770 disc interface).

Launch Offer **£449** (Carr. £12)

At last, it's here!
The Advance Reference Manual for the BBC Master
£19.95

NEW

DISC DRIVE SHARER



(Ideal for educational establishments)

At last, a low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not compatible with ADFS.)

Launch Price: **£59** Price includes 3 Cables

NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

If you already have the Watford Electronics DFS and wish to incorporate these new facilities then simply return your existing DFS ROM to us together with £5 remittance for an upgrade. Please pack the ROM securely and address the package to our Upgrades Dept.

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for five years and has gained a large following amongst serious and educational users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS). (not Acorn's 1770 DFS)***

- *Complete Disc Interface Kit including DFS ROM and fitting instructions* £48
- *Acorn's 0.90 DFS Kit complete* £47
- *DFS Manual (Comprehensive)* (no VAT) £6.95
  (P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs).
- *Watford's sophisticated DFS ROM only* £16
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* £12
- *DNFS ROM only £17* ● *ADFS ROM only £25*
- *Watford's DFS is exclusively available from Watford Electronics and their appointed dealers only. Every ROM carries a special label with LOGO and serial number.*

NEW

WATFORD's Mk II Double Density DFS INTERFACE

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our MkII DDFS board has been adapted to allow the use of Acorn ADFS.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

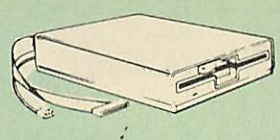
Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!
If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£30.00**.

- Special introductory offer £39.00
- DDFS Manual (No VAT) £6.95
  - We will exchange your existing DFS Kit for our sophisticated DDFS for only £25.00

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

SPECIAL DISC DRIVE/DDFS OFFER

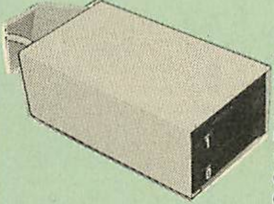
Type CLS400



- The popular Mitsubishi 400k Single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's popular DDFS Disc Interface (allows 720k storage). Will run in both Single and Double Density modes 40/80 track Software switchable.
- A comprehensive User Friendly Manual.

A Bargain at Only **£130** *(£6 carr)*
(Offer valid while stocks last)

3½" DISC DRIVE OFFER



These top quality 3½" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc. They run directly from the BBC B/Master's own PSU.

- Single 400K Drive **£69**
- Twin 800K Drives **£126**

Mysteries of disc Drives & DFS Revealed

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

£5.95 (Book No VAT)

DISC ALBUMS

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

£4

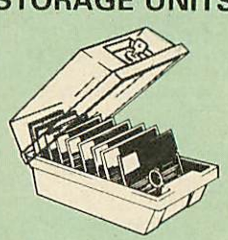
FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

£7

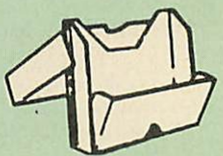
ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.



- **M35** - holds upto 50 5¼" discs **£6.00**
- **M85** – holds upto 95 5¼" discs **£8.00**
- **M25*** – holds upto 25 3½" Discs **£5.50**
- **M50** – holds 50 3½" Discs **£7.50**

* Not lockable



PLASTIC LIBRARY CASES

Holds up to 10 5¼" Discs. **Only £2.00**

DISC PLONKER RACK

When using ones micro, there is a tendancy to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk.
Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. It holds up to eight 5¼" Discs.



Protection at Only: **£2**

DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.

***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

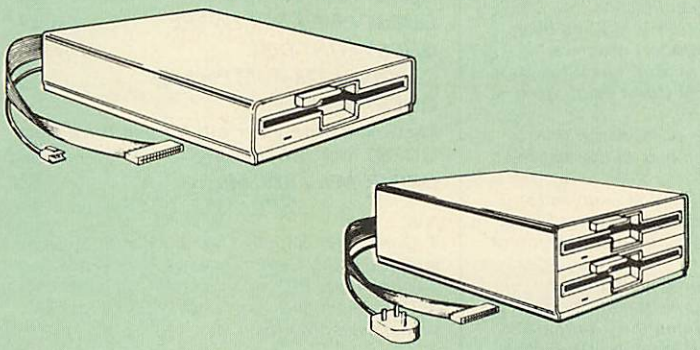
Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 6th page of our advert for the Plinths).

P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
200K (360K)	CLS 200 £89		CS 200 £98	
400K (720K)	CLS400S £89	CLD 400 £168	CS 400S £99	CD400 £188
800K (1.44M)		CLD 800S £169		CD 800S £188

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
Securicor carriage on Disc Drives £5 to £6

Prefix C = Cased Drive
L = Less PSU
S = Single
D = Double

Suffix S = 40-80 Switchable

e.g. *CLS400S = Cased Disc Drive, Less power supply unit, single 5¼" 400K, (720K in double density); Double sided; 40/80 track switchable.*

Cable to connect 5¼" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3½" and 5¼" Disc Drives simultaneously to the BBC Compact £13

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.

- *10 × 5¼" S/S D/D 40 Track Diskettes* — ***£8.25***
- *10 × 5¼" D/S D/D 40 Track Diskettes* — ***£10.20***
- *10 × 5¼" S/S D/D 80 Track Diskettes* — ***£12.75***
- *10 × 5¼" D/S D/D 80 Track Diskettes* — ***£13***
- *10 × 5¼" 1.6M D/S D/D High Density Discs for IBM XT and AT* — ***£28***
- *10 × 3½" S/S D/D 40/80 track Discs* — ***£13.50***
- *10 × 3½" D/S D/D 40/80 track Discs* — ***£19***

TOP QUALITY 3½" & 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

- *10 × **M3** 3½" D/S D/D 80 Track Discs* — ***£18***
- *10 × **M4** 5¼" S/S D/D 40 Track Discs* — ***£6.50***
- *10 × **M5** 5¼" D/S D/D 40 Track Discs* — ***£8***
- *10 × **M7** 5¼" D/S D/D 80 Track Discs* — ***£9***
- *3" Double Sided Discs* — ***£3 each***

Special BULK OFFER on 5¼" DISCS

PRICES SLASHED

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£35	£39	£45
● With Sleeves	£38	£42	£48

ACORN WINCHESTER DRIVES

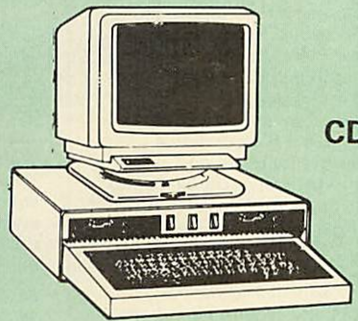
FILESTORE E01	£825
FILESTORE E20	£705
Acorn 30MB Unit incl. Level III Software	£1520

PRICES SLASHED

WATFORD's WINCHESTER DRIVES

- 10 Megabyte Unit with ADFS — **£399**
- 30 Megabyte Unit with ADFS — **£449**
- 40 Megabyte Unit with ADFS — **£749**

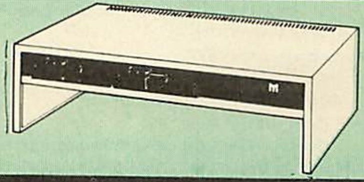
CDP800S **CDPM800S**



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The switches are mounted on the front panel for ease of use.

CDP 800S for BBC Micro £192
CDPM 800S for Master £196
(Securicor Carr. £7)
(The above drive units are 2 Megabytes unformatted)

ACORN'S Twin 800K Disc Drives



Specially mounted side by side in a Master Plinth. Supplied complete with Cables. Plugs directly to the Master Computer.

RRP ~~£350~~

Our Price: Only £182
(carr £7)

Continued →

NOMINATED FOR MICRO BRITISH COMPUTING AWARDS 1987

QUEST MOUSE

QUEST MOUSE

The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and is smooth and easy to use on most work surfaces. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that it will work with any of the AMX range of software.

The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.

QUEST PAINT

The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.

The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.

SOFTWARE FEATURES

The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.

Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.

Take The Guesswork Out of Selecting a Mouse Package

With reviews like this how can you go wrong.

Popular Computing Weekly, 9-11 June '87

"What you actually get for your money is a well built, three button mouse (far superior to the AMX mouse)."

"Overall the combination of a quality mouse and decent art package gives Watford Electronics a real chance of supplanting AMX as mouse supremos."

Micro User June '87

"Quest Mouse and Quest Paint can hold their heads high in the market. . ."

A&B Computing June '87

". . . Watford Electronics, a company famed for excellent hardware add ons and versatile software packages. Called Quest mouse, "this is a very special mouse driven drawing package..."

". . . you will have one of the most comfortable and professionally built mice I have used in a long time. The buttons are responsive, the mouse movement is smooth and without directional bias – a pleasure to use."

"What we have here is probably the best art package there is for the BBC Micro . . ."

"Quest Paint is a major leap forward in BBC programming. . ."

"Quest Paint is an original piece of programming, it is friendly and well endowed with many useful facilities. I would comfortably say it is easier to draw good pictures with Quest Paint than it is with more expensive 'Professional' art packages for the Atari ST and the Commodore Amiga. A recommended buy if you are looking for the best in BBC micro based art packages".

Acorn User, September '87

"The mouse (Quest) performs well in the face of competition from AMX, Wigmore and the rest . . ."

". . . this package represents excellent value for money. If you are interested in art then this program is for you to buy".

"Given time, I can see no reason why Quest Paint shouldn't take on the title of the definitive art package available for the BBC Micro to date".

"All in all, Quest Paint is a very professional package. It contains virtually every feature the budding artist could require".

"What makes Quest Paint so versatile is the addition of a sub-menu which allows you extensive control over each function".

"Until recently, Superart from AMS had been judged as the definitive mode 1 graphics package for the BBC micro. But now it has a serious rival in the form of Quest Paint, from Watford".

"As a measure of what is contained within Quest Paint, I would say it had all the features of Superart plus . . ."

"In most art packages, provision is given for drawing triangles and rectangles. Quest Mouse goes 14 better, allowing any regular polygon of upto 16 sides".

"One facility, not found on any other Art package to my knowledge, is the ability to access a digitiser from within the program". The reviewer concludes by saying, "The result is an extremely comprehensive and professional art package".

John Kilby, Head of Computer Science, Bishop Wulstan High School, Rugby, writes:

"Quest has been an excellent piece of equipment. The problem that seems to occur everyday is that at lunchtime the pupils rush to the computer room to make sure that they are first in the queue for the 'Quest' mouse".

Lt. Cln. C.G. Holton, G2 HQ 1 (BR) Corps, BFPO 39, writes:

"As ever your service is superb and the Quest Mouse proves every bit as good as the adverts claim".

Beeblet User Group, New Zealand Oct '87:

"One of its nicer features is that the top menu is done in Mode 0, the drawing itself is in Mode 1. Thus on screen together are two different Modes. A neat way around an old problem".

"PAN is used when a larger than one screen size image is required. The mind boggles at an A3 size drawing".

"I like it partly because of the mouse itself which is smooth and easy to handle but mainly I suppose because of the features I longed for and previously never got. Its easy to use with almost everything at your fingertips from the mouse. The software is simple where needed and complex where complexity is required".

ConQuest

Watford's Quest package is an extremely powerful and flexible drawing package, with very wide and unusual features. However, since its launch various suggestions for even more advanced & powerful facilities were received from the Quest users. ConQuest allows you these more advanced facilities, like, distortion of a cutout to any shape and a full font designer. If you also have a GXR ROM in your machine or you are using a BBC Master then ConQuest will take advantage of this to give ellipses at any angle, sectors and arcs, etc. Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

Some of the features are:

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

QUEST MOUSE & QUEST PAINT	***£59***
QUEST MOUSE, QUEST PAINT, AMX PAGEMAKER & PAGEFONT	***£85***
QUEST MOUSE ONLY	***£29***
QUEST PAINT SOFTWARE	***£32***
QUEST FONT DISC	***£12***
ConQuest 32K ROM Package	***£29***
QUEST MAT	***£3***
Part-exchange your old Mouse for a New QUEST MOUSE for only	***£23***
GXR ROM for BBC Micro	***£22***

N.B.

1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.

2. Quest Font Disc has 22 text FONTS for use within Quest Mouse.

MARK II LIGHT PEN

Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.

Price Only £21

(Price includes FREE software Disc and Operating Manual)

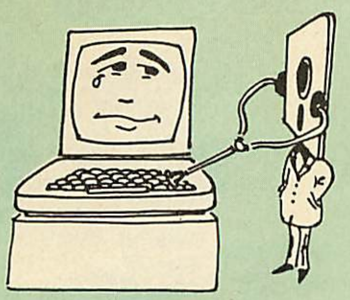
RB2 Marconi Tracker Ball

RB2 (AMX/Quest compatible)	£59
RB2 including Quest Paint	£85

FLEET STREET EDITOR

Software pack for BBC Micro	£31
Software pack for the Master	£39
Software Pack for Compact	£40
Admin Xtra Disc Utility	£13
Walt Disney Disc Utility	£13
Fonts N Graphics Disc Utility	£13

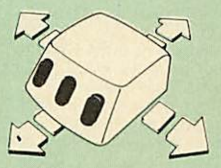
DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.
The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.
This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

THE NEW Mk III AMX MOUSE



ONLY: £59 **Inc. Super Art package**
(carr £1.50)
(Please specify for BBC, Master or Compact)

FREE our popular Colour Art software pack worth £15 with every AMX Mouse package purchased from us.

AMX MAT	£3
AMX MOUSE ONLY	£29
AMX DESK Package	£19
AMX UTILITY Package	£11
AMX SUPERART Package	£39
AMX STOP PRESS – A Desktop publising software. Works with Keyboard, Joystick or a mouse	£32

We are giving away absolutely FREE, our PAGE-FONT disc with every purchase of STOP PRESS from us.

PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£9.50
AMX DESIGN (ROM)	£59
AMX 3D ZICON Disc	£19
AMX Database Disc	£19
AMX XAM Educational	£15
AMX EXTRA EXTRA	£19
AMX MAX A gem of desktop (ROM)	£15

TED

THE ULTIMATE TELETEXT SYSTEM

TED is one of a new generation of powerful 32K ROMs for the BBC B, B+ and Master computers and is compatible with disc, tape and network systems. It is in everyday use in schools, colleges and universities, Programmers, Prestel I.P.'s, Micronetters and exhibitors have also found it indispensable.

TED includes the most comprehensive teletext (Mode 7) screen editor ever written for the BBC micro, combining flexibility with ease of use. Its sophisticated facilities include line, column and block copying within AND between frames; text, in a variety of styles and sizes, entered directly from the keyboard; graphics and line drawing modes; search and replace; margins; printer dump routines and a library of in-built icons and typefaces. TED will edit ANY mode 7 screen and can even convert high-res graphics screens to mode 7! Included within the ROM is a fully Epson compatable mode 7 graphics dump routine giving a grey scale printout of exactly what appears on the screen.

Using '*SHOW' (a versatile carousel), collections of mode 7 screens may be 'routed' or displayed sequencially, making it ideal for creating and running 'Viewdata' information systems. Over 1200 frames may bestored on a twin 80 track drive. A unique feture of TED is '*SCROLL', which lets you create pages of up to 600 lines which may be viewed 'Wordwise style', automatically or manually. SHOWs and SCROLLs may be freely mixed and even used from within a BASIC program.

The package comprises a 32K ROM, a 117 page manual, a function-key strip and a demonstration disc containing examples of real-time animation and a sample 55-frame database. A stand-alone machine code routine is provided allowing SHOWs and SCROLLs to be displayed on machines not fitted with TED.

Price: £35

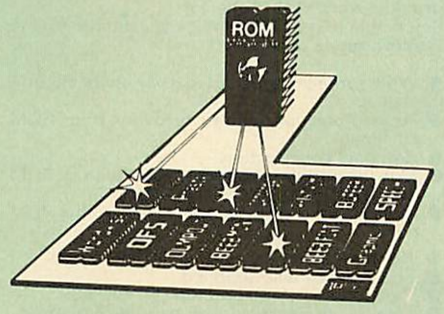
ROM-SPELL



Probably the most advanced and fastest spelling checker available for the BBC Micro. Compatible with View, Wordwise and Wordwise Plus ROMSPELL is simple to use with easy editing of incorrect words. Full facilities for editing the user dictionary to allow customisation to your personal needs. Dictionary includes over 30,000 words and is supplied with a Comprehensive manual.
NOT compatible with 1770 DFS.
(Please state 40 or 80 track disc)

Price still only: £25

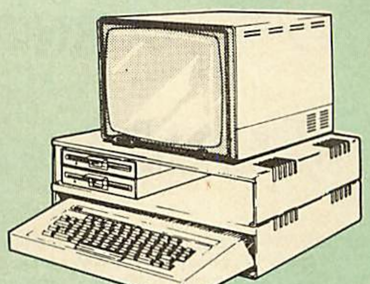
ROM MANAGER



Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.
"Provides comprehensive management of all your installed ROMs". (BEEBUG November '84.)

ONLY £20

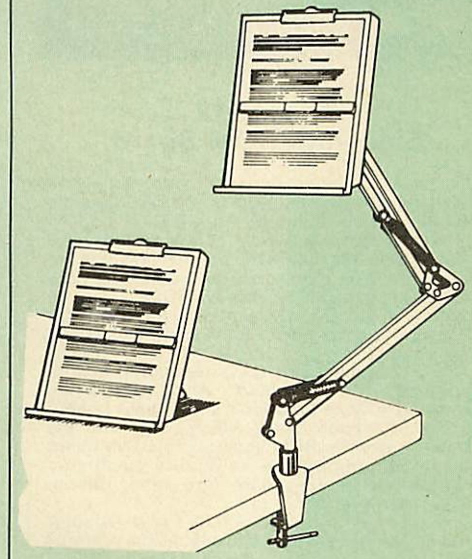
PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£19** (carr. £3.00)
PRINTER PLINTH	**£10** (carr. £1.50)
SINGLE MASTER PLINTH	**£14** (carr £1.50)
DOUBLE MASTER PLINTH	**£24** (carr £3.00)

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in 2 versions, desk resting and shelf clamping versions, these two units hold your paper firmly by means of a plastic retaining ruler and a clip grip. Both units are full A4 size.

Amazing value at only
Desk Top **£10** (carr. £2)

Angle poise **£14** (carr. £3)

Continued

ARIES CORNER

The Aries B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

Price: **£80** (carr. £2)

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

Price: Aries B-12	**£40**
Aries B-12C	**£5**

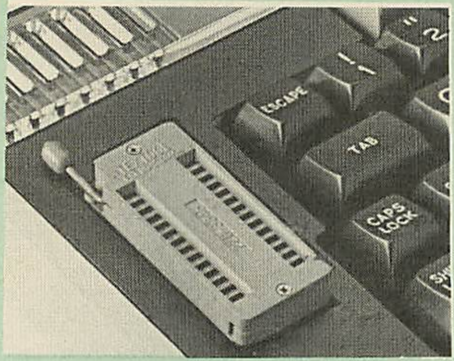
ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

All prices in this advert are exclusive of VAT.

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£15** (carr £2)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

● Complete System	**£11**
● Spare Cartridges	**£2.50**
● Spare Rack	**£1.50**

16K Sideways RAM Modules

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.

Key points to note about this new addition to the Watford range of products are:

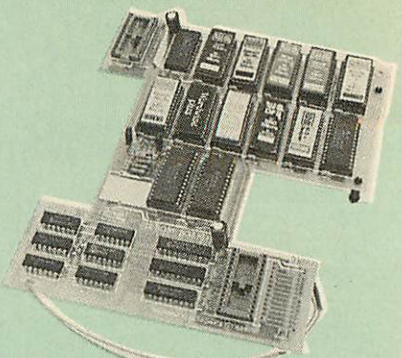
- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£24** (carr £2)

Optional extras

READ and WRITE protect Switches **£2 each**
Battery for Battery Backup **£3**

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success"

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

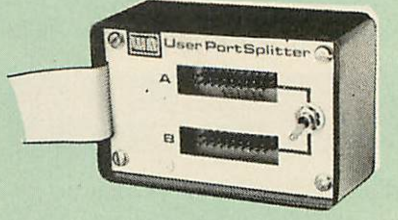
- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
(carriage £2)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

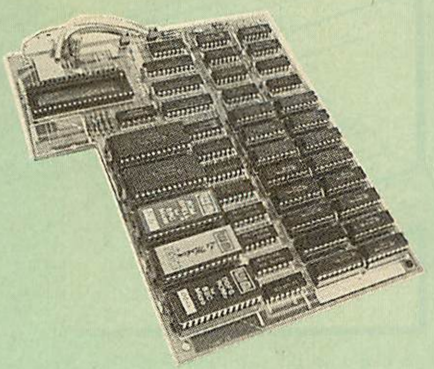
USER PORT SPLITTER UNIT



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaniously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£21**

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

- ROM/RAM card with 32k dynamic RAM *£39*
- ROM/RAM card with 64k dynamic RAM *£52*
- ROM/RAM card with a massive 128k dynamic RAM £80

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit £6
- 16k Dynamic RAM for Upgrade £7.50
- Battery backup £3
- Read and Write protect switches ...... £2 each

Complete ROM-RAM board
All options installed £89

P.S.
Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £10 less

Le Modem



The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- ***FREE Registration to MicroLink.***

SPECIAL OFFER

Price: ***£94***
(carr £3)

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

Minerva Systems Software

System Delta with Card Index	£55
System Programmers Ref. Guide	£19
System Gamma	£43
System Gamma Prog, Ref, Guide	£19
System Mailshot	£17
System Reporter	£17
System Intrer/View Link	£17
System Sales Ledger	£39
System Purchase Ledger	£39
System Nominal Ledger	£48
System Stock Management	£39
Order Processing/Invoicing	£39

APOLLO

The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**
- **£6.50 off annual Membership to Micronet, Prestel and Telecom Gold.**

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Only: **£94** **(Carr £3)**
Price includes, the Modem, Comm Software Cables & Operating Manual).
(Write in for full specification)

Nightingale Modem

SPECIAL PRICE to our Customers

£82

(Price includes: Nightingale Modem, Commstar ROM pack & Comprehensive manual)

Nightingale Modem without software	**Only £75**
COMMSTAR ROM package only	**£29**

(P&P on modem £3.00)

Versatile **BEEB SPEECH SYNTHESISER** Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£48
CARETAKER Basic Utility	£25
DISC DOCTOR	£28
Graphics ROM	£23
TERMI	£25
COMMUNICATOR	£49
SPEECH ROM	£24
Printmaster	£24

Wordwise £24

Wordwise plus £40

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only £24

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS DISC: £5

SPELL MASTER £45

Inter SHEET ONLY £37

INTER-CHART ONLY: £26

Inter-WORD £39

MEGA-3 ROM

Interword, Intersheet & Interchart – 3 in one ROM £85

INTERBASE £55

All Prices Exclusive of VAT

VIEW

VIEW WORDPROCESSOR 2.1	£35
VIEW 3.0 ROM	£48
VIEW PROFESSIONAL	£79
HI-VIEW (for use with 6502 2nd Processor)	£36
VIEW Printer Driver Generator (Please specify Disc or Cassette)	£9
VIEWSHEET (Acornsoft)	£37
VIEWSTORE	£37
VIEWSPELL with 80 track disc	£29
VIEWPLOT Disc (Please specify for Master 128 or Compact)	£22
VIEW-INDEX	£12
OVERVIEW Packs 1 & 2 for the Master	£75

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	£8
Juki & Brother HR15 (Disc)	£8
Silver Reed Printers (Disc)	£8

Micros in Business (Disc)

An introduction to Business software for the BBC Micro from Acorn £43

ADVANCE COMPUTER PRODUCTS' ROMs

Adv. Disc Toolkit	£29
Adv 1770 DFS for Mast/Compact	£29
Adv 1770 DFS for BBC/BBC+	£29
Adv Disc Investigator	£24
Adv. Control Panel	£29

MINI OFFICE II

Disc Version	£14.50
ROM Version	£47.00

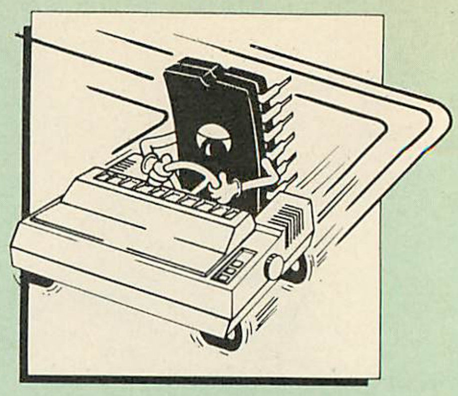
REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£13 (40 or 80 track)

Acorn's Speech Synthesiser package, complete
Special Offer £18

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

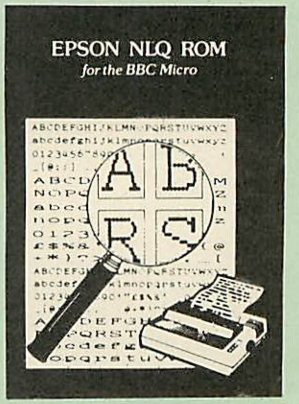
The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33



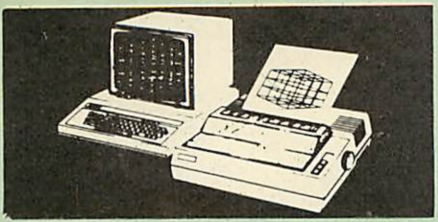
Harness the full potential of your Epson RX or FX printer. The NLQ ROM makes Epson printers produce Near Letter Quality output with optional proportional spacing, enlarged and underlined. Accessed by simple * commands from Basic, Wordwise and View (with driver) or almost any other language.

(Send an SAE for sample printout)

Only: £25

VIEW PRINTER DRIVER for NLQ ROM £7

DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics.
Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

- Vertical and horizontal scaling in all graphics modes and mode 7
- Rotation of image by 90, 180 or 270 degrees
- Left hand margin setting
- Screen dump window setting
- Colours appear as grey scale
- Two tone fast dump
- Colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered and User Port triggered dumps

The Micro User Feb. 1985.
'Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC Micro . . . it must represent excellent value for money and surely cannot be beaten".

For use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1081/82, Mannesman Tally and compatibles.

Only: £25

BBC SOFTWARE'S
Popular Educational Software

- Maths with a Story 1 (Cassette). 4 primary level maths programs **£9.95**
- Maths with a Story 2 (Cassette) 4 further maths programs **£9.95**
- Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs **£17**
- WAVES: Science Topics (Disc) CSC O Level Physics program. **£14.95**
- RELATIONSHIP: Science (Disc) O Level Biology program. **£14.95**
- BONDING: Science (Disc) O Level Chemistry program. **£14.95**
- ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program. **£14.95**
- ELECTRONICS IN ACTION (Disc) O Level program **£14.95**
- NEWTON & THE SPACE SHUTTLE (Disc) O Level program. **£20**
- ECOLOGY (Disc) O Level program. **£20**
- POLYMERS (Disc) O Level program. **£20**
- Clasification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. **£20**
- FOOD & POPULATION (Disc) O Level program. **£20**
- MICROTECHNOLOGY (Cassette) O Level program. **£6.95**
- A VOUS LA FRANCE (2 Cassettes) A French language home study aid. **£17**
- DEUTSCH DIREKT! (Disc & Audio Cassette) **£20**
- Modem Master (Disc) **£11.25**
- ADVANCED TELETEXT SYSTEM **£9**
- PERIOD TABLE SOFTWARE **£20**
- USING YOUR COMPUTER (Cassette) 8-12 age **£24**
- Astronomy – Primary Disc **£11**
- Computers at Work – Primary **£16**
- Introducing Geography – Primary **£16**
- Electric Fields 6-14 years **£10.50**
- Statistics A level **£23**

THE NLQ DESIGNER

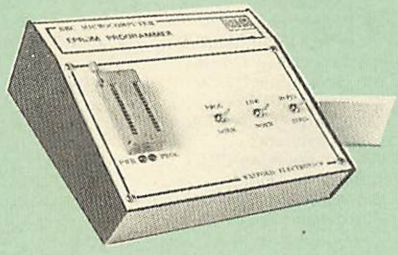
(The First & still the Best)
Supplied with over 25 Different fonts

A massively useful utility for users of the Taxan/Kaga KP810/910 or the Canon PW1080. This program allows you to define NLQ character sets to download into the printer's memory. Full on screen editing of the font. Requires 6264 RAM chip to be fitted in the printer.
Supplied with disc containing over 25 example fonts. (Please specify 40 or 80 track when ordering.) Fonts are: Italic, Courier, Courier Italic, Script, Copper Plate, Shadow, Bold, Double Print and Gothic etc. (P.S. This ROM is not suitable for Epson printers.)

- NLQ Designer ROM, FONT Disc and Manual **£25**

(Write in for further details on all above ROMS)

ADDER



The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.
Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.

Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

£75 (£3 Carr)

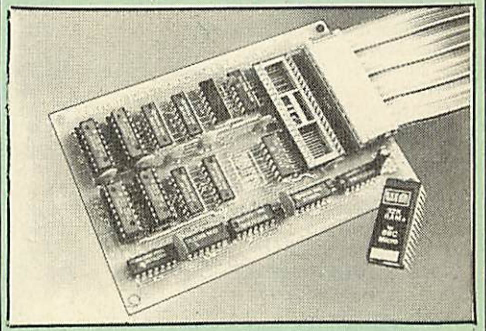
TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

32K

SHADOW RAM-Printer Buffer
Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.
- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £59 (carr £2)
(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORDPROCESSING DEAL

Watford's 32K SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89** (carr £2)

Continued →

BOOKS (No VAT on Books)

15 Hr Wordprocessing BBC/View	£4.95
15 Hr Wordprocessing BBC/WW & WW+	£4.95
30 Hour BASIC (BBC Micro)	£9.95
40 Best machine Code Routines	£7.95
50 Programs in BBC BASIC	£6.95
6502 Assembly Language Program	£19.95
6502 Application	£11.95
6502 Assembly Lang. Subroutines	£19.95
6502 Development Package	£7.50
6502 Reference Guide	£10.95
68000 Assembly Language Prog.	£19.95
68000 Machine Code Programming	£13.00
68000 Microprocessor Handbook	£14.95
68000 Programming the	£22.95
68000 User Guide	£8.95
6809, Programming the	£16.95
6809 Machine Code Programming	£7.95
8086/8088 Assembly Language Prog.	£11.95
8086/8088 Programming the	£16.95
Advanced Disc User Guide	£16.95
Advanced Prog. Guide to BBC	£9.95
Adv. Sideways RAM User Guide	£10.95
Advanced User Guide for BBC	£10.95
Advanced Graphics with BBC	£10.95
Assembly Language Programming on BBC Micro	£11.50
Adventure into BBC BASIC	£6.95
Amiga Hardware Ref Manual	£23.70
Applied Assembly Lang. for BBC	£9.95
ARM Assem, Lang, Programming	£12.95
Art of Microcomputer Graphics	£15.95
Assembly Language Programming FOR the BBC Micro	£9.50
Assembly Lang. within BBC	£11.95
Basic ROM User Guide	£11.95
BBC B Compendium	£5.95
BBC BASIC for Beginners	£7.95
BBC Forth	£7.50
BBC Hardware Projects	£8.95
BBC Micro & Small Business	£5.75
BBC Micro & the small Business	£5.75
BBC Micro Advance Programming	£8.95
BBC Micro Basic Sound & Graphics	£7.95
BBC Micro Programming Tips	£8.95
BBC Micro ROM Book	£10.95
BBC Master 128 for High Flyer	£10.95
BBC Micro Disc Companion	£8.95
BBC Software Projects	£6.95
BCPL User Guide	£14
BCPL The Language & its Compiler	£7.95
C Big Red Book of	£7.50
C for Beginners	£10.95
C for Programmers	£9.95
C Programming Lang.	£23.95
Complete FORTH	£6.95
Computer Graphics & CAD fundamentals	£9.95
CP-M-86 User's Guide	£19.95
CP-M Bible	£16.50
CP-M Handbook with MPM	£9.95
CP-M Plus Handbook	£13.95
CP-M Soul of	£16.50
CP-M The software BUS	£8.95
Disc Drive Projects for Micros	£5.45
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
DBASE Programming Language	£14.95
dBase III Plus	£12.95
dBASE III Plus, Quick Ref. Guide	£4.95
dBase III Tips & Tricks	£14.25
Disc Programming Techniques	£9.95
Exploring FORTH	£6.95
File Handling on BBC Micro	£7.50
FORTH – Acorn	£7.50
FORTH – Advanced	£9.95
FORTH – A Text Reference	£19.10
FORTH on the BBC Micro	£9.95
FORTH – Starting	£19.10
Functional Forth for the BBC Micro	£5.95
Guide to BBC ROMs	£9.95
Graphics for Children	£6.95
Hackers Handbook - New	£6.95
Inside Information (Computers, Interfacing & Control o/t BBC Micro	£9.95
Interfacing & Robotics on BBC	£15.95
Introduction to COMAL	£9.50
Introduction to LOGO	£6.95
Introducing 'C'	£9.95
Introducing LOGO	£5.95
Introduction to FORTH	£8.95
Introduction to PASCAL	£17.95
ISO-PASCAL Reference Manual	£9.95
LISP 2nd Edition	£15.95
LISP, A Beginners Guide to	£10.95
LISP on the BBC Micro	£7.95
LISP the Language of Artificial Intelligence	£9.95
Logo on the BBC Micro	£7.50
Logo Programming	£10.95
Mysteries of DISC DRIVES and DFS REVEALED	**£5.95**
Mastering Assembly Code	£8.95
Mastering CP-M	£17.95
Mastering Interpreters & Compilers	£14.95
Mastering Music	£6.95
Mastering the Disc Drive	£7.95
Mastering Operating System	£12.95
Master Reference Manual Part 1	£14.00
Master Reference Manual Part 2	£14.00
Master, Advance Reference Manual	£19
Mathematical Prog. in BBC Basic	£7.95
Micro Prolog	£10.00
Microtext for the BBC	£10.00
MS DOS Quick Referance Guide	£3.95
Practical Disc File Techniques	£5.95
Programming the 6502	£16.95
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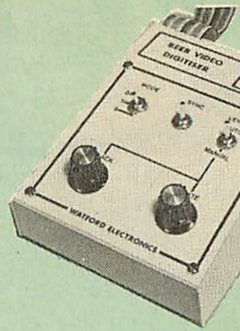
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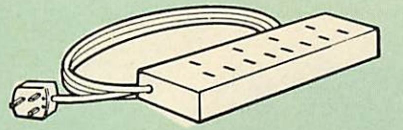
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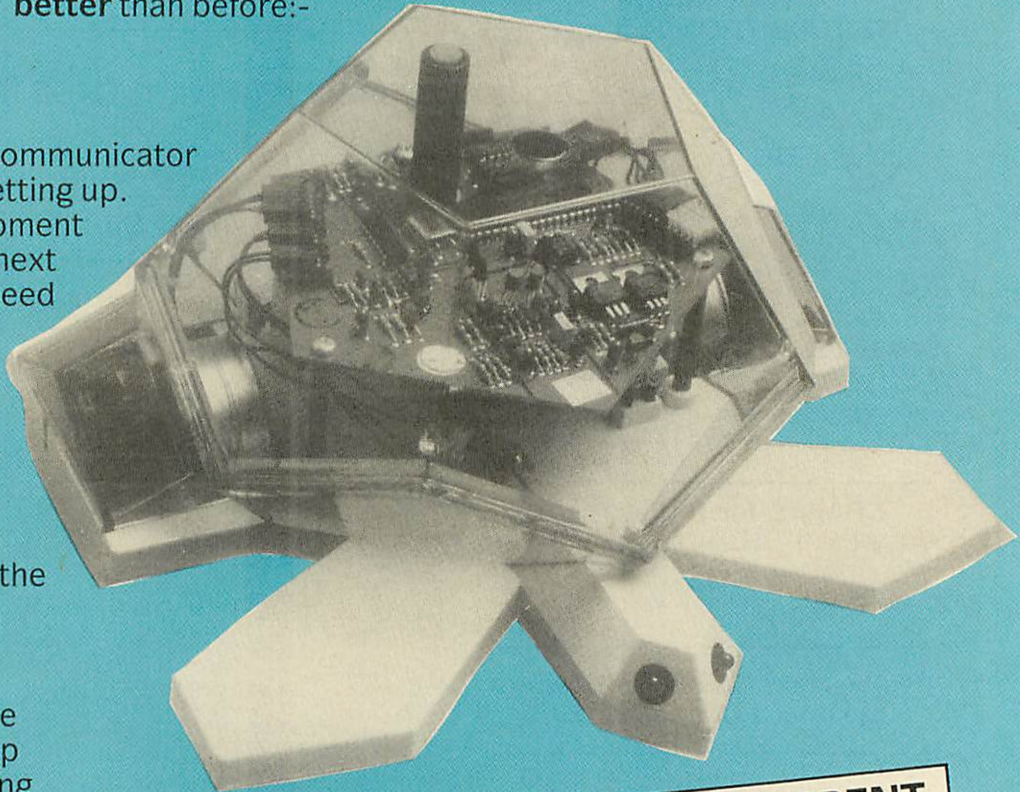
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CONTROL TRICKS

Linking your micro to the outside world is made easy with a special control language, MCL

Joe Telford



ILLUSTRATION BY MICKEY FINN

Many people miss out on a range of exciting computer related activities by thinking that 'control' is far too complex. They often assume it is exceedingly difficult to program, and that the hardware is hard to build.

Control in the context of computing means the monitoring of physical changes in the environment, and the control of other devices.

Much exploration of control activities, particularly in schools, comes from controlling models. Another way of learning about control is to use sensors to monitor and record changes in the environment, like light levels, sound intensity, temperature and dampness. These activities are often called 'data logging.' You do need to appropriate the hardware from some source, and for many folk building interface boards is relatively easy, however, in many cases it is easier to buy pre-built and pre-tested interfaces like the Control-IT buffer box from Deltronics, or the Barnet Box from Commotion. It simply boils down to the old problems of constructional skills versus reliability and product guarantees.

Acorn User doesn't encourage you to work beyond your competence, and mains electricity projects for your children or yourself are never advisable. But the main danger when controlling devices is lack of forethought. Provided you always begin by thinking 'How can this project be made safer?', then the danger of any control activity is reduced.

The software

While most readers are confident with Basic and even Pascal, C or Logo, there are those users who want to be involved in computing with a minimum of programming effort. The ultimate icon-based control programming that is beginning to appear in minicomputer-based industrial software hasn't reached the home yet, but simple, easy to use languages for control programming are available at reasonable prices. MCL (Micro Control Language) is such a

package, and recently I had a chance to try it out.

The manual is a well written, though slightly verbose text, which has two main sections. The first is a tutorial of some 37 pages. You learn how to use MCL via a series of real control applications. If readers could assemble the necessary hardware for each application, then by the time they completed the tutorial section, they would have learned a good deal about programming for control, and also picked up considerable knowledge specific to MCL. One slight problem is that as the applications are discussed in general terms to aid the tutorials, there is no serious consideration of the problems in getting the hardware for the applications to work. I felt that some examples relied too much on imagination.

The second section of the manual includes 54 pages of reference material, split into sections covering the MCL commands, variables, loops and so on. It's mostly language specific, whereas the first section contains a good deal of general control information. This is the section of the book which will become dog-eared as experimenters look for the precise syntax of commands.

The MCL language

The Micro Control Language ROM is the latest in a long line of control-specific languages. Do you remember how languages like Dart and Computer Concepts' Logo emulated the graphics elements of true Logo? Well, in a similar way languages like Bits and Control-IT and *Acorn User*'s own *Switch* program from October 1987 have paved the way for MCL. MCL is exceptionally fast, and it covers all the standard BBC control ports. It is like Basic in that editing is performed using line numbers, but it is also Logo-like because each program can be split into a series of words, which can be called from one another. The language supports variables and powerful sequence control commands, as well as the usual loops and procedures. Graphics are specifically directed at data logging and graph drawing, and for this they are very powerful. The two major omissions from MCL are functions and filing. But there is very comprehensive help text for every element of the language. And there is a rudimentary multi-tasking facility. This enables a simple comparison to be made after every line of a program; action is taken when necessary.

Figure 1 shows the range of commands and keywords available in MCL. One

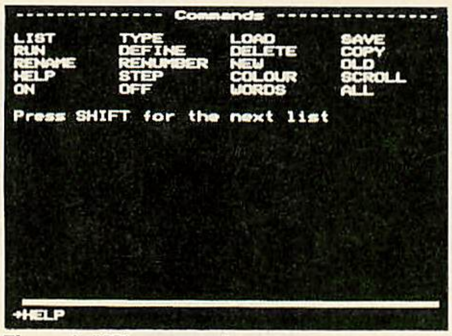


Figure 1. MCL commands

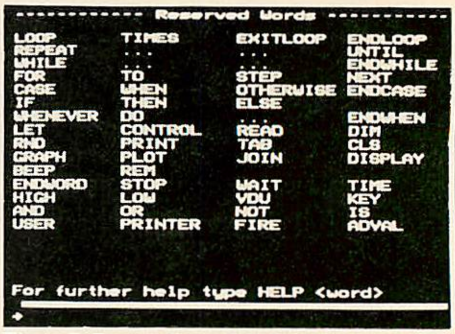


Figure 2. Reserved words in MCL

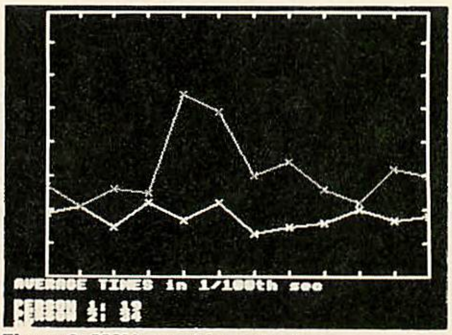


Figure 3. MCL's graphics output

Test	MCL	Basic
1: 1000 Loops	0.53s	0.70s
2: 1000 Memory assignments	4.53s	1.63s
3: 1000 Additions	5.30s	1.57s
4: 1000 Additions + assign-	14.01s	2.48s
ments	19.80s	5.13s
5: 1000 *, /, +, assignments	23.91s	5.87s
6: 1000 as above + 'IF' constructions		

Figure 4. Benchmark tests

interesting difference between MCL and Logo is that commands like RUN and LOAD, etc, cannot be used in statements. So the line:

LOAD "nextpro" :RUN

results in an error. There is also a series of commands in MCL, such as SCROLL ON and OFF which convert between standard scrolling screen and a Sinclair Spectrum-like screen which is the default format for program entry. COLOUR ON and OFF gives us the choice between a monochrome and colour display. STEP ON and OFF lets you execute programs line by line on pressing the Shift key.

Like Logo, MCL expects a top down approach to programming, and hence the language works by defining 'words' which are internally similar to small Basic programs or procedures. Say for example we want to define a word to increment a counter by a certain value every time it is called. You can type:

```
DEFINE inc (value)
counter = counter + value
ENDWORD
```

Now every time we type 'inc(1)', or come across that statement in a program, the variable 'counter' will be incremented.

But there are some problems in defining words. The manual says lower case definitions can't be used – they can. Next, the only way to change a defined word with an incorrect header, for example 'DEFINE inc' that should have been 'DEFINE inc(value)', is to list the function then type 'RENAME inc(value)'. Although procedures can take a number of parameters, no procedure can return a parameter, other than by storing it in a global variable.

Words can be manipulated using LIST <word> which lists a particular word, LIST ALL which lists everything in memory, or LIST WORDS which lists the names of all the words. The COPY command allows more than one word with the same contents to exist, though the names are different. This is a useful way to start editing words when they are only slightly different. Any action on a word can only happen when that word is the current word. To select a word as the current word you simply list it, then you can RUN, RENUMBER, RENAME, or COPY it.

MCL has four types of variable: integer variables which are whole numbers up to 2,000,000,000; input variables which can be either HIGH or LOW; output variables which can be HIGH or LOW; and analogue variables which can be in the range zero to 4095. The language can't handle real numbers (decimals) or string variables, so no interactive dialogue using strings is available.

The variables which exist do however cover most needs for control programming. There is even an integer array facility for data logging or more complex control, similar to the Basic DIM statement.

Accessing the outside world

The aim of any control language is to ease the problem of accessing the outside world. MCL is very successful at this. You can use

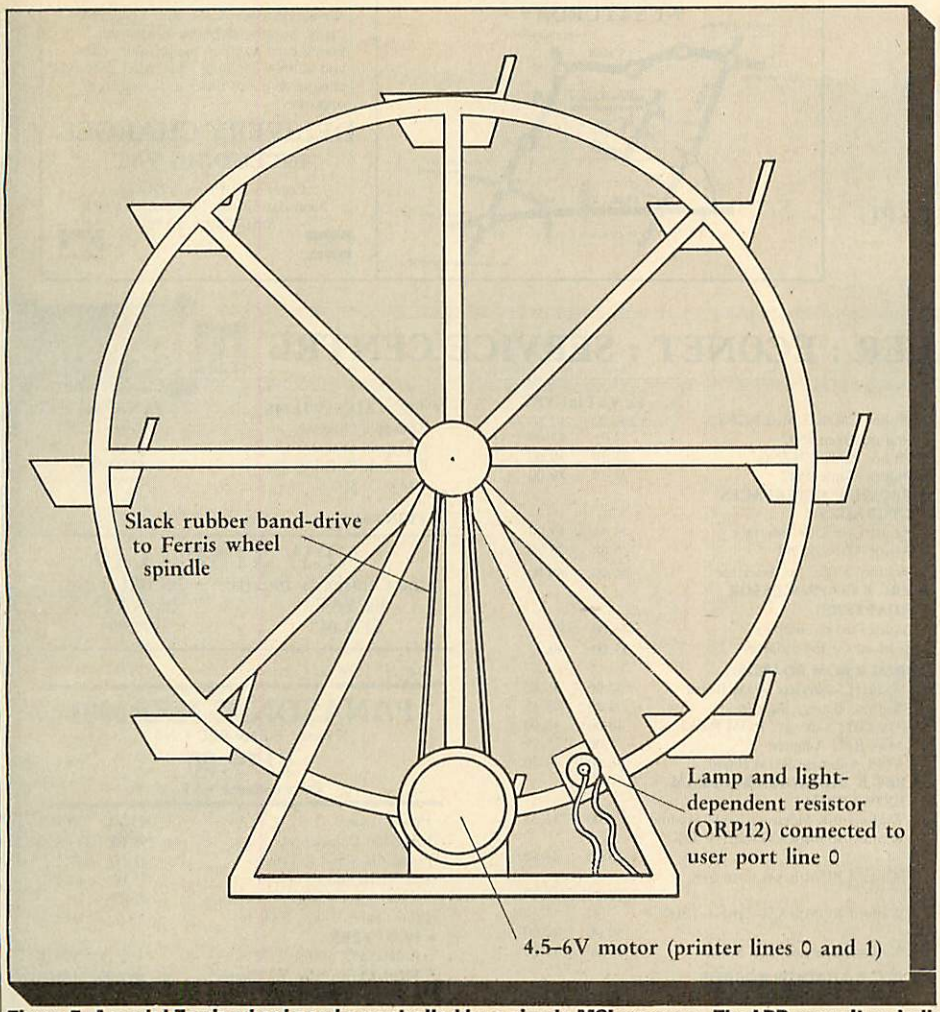


Figure 5. A model Ferris wheel can be controlled by a simple MCL program. The LDR opposite a bulb detects the spokes of the wheel as they pass, allowing the micro to move the wheel round one step at a time. When all of the seats are 'full', the wheel spins (see over)

the printer port for output, the user port for both input or output, the analogue port for input, and the joystick fire buttons for input too. Each of these ports is separated into a number of lines, so that line 5 on the printer port can be referred to as PRINTER (5). What is useful is that this line can also be referred to by a name, usually the name of whatever it controls in the real world. For example, if a heater is connected through a suitable interface to printer port line 5, then the statement:

LET heater CONTROL PRINTER (5)

would ensure that the heater could be turned on by

heater=HIGH

and off by

heater=LOW

But it doesn't stop there. The state of the heater can be defined: because we said the heater should be on or off we can define two new variables:

on=HIGH

off=LOW

and we can say:

heater = on

heater = off

This becomes even more powerful if you want to control a device like an electric motor which has three states of operation – forward, reverse, stop. The normal approach is to use two lines of the printer port, and with MCL you can produce an elegant solution:

```
LET motor CONTROL PRI
NTER (0) TO PRINTER (1)
   forward = 1
   reverse = 3
   stop = 0
```

Now you can say:

```
   motor = forward
   WAIT 100 :REM ie Wait
 1 sec
   motor = reverse
   WAIT 100
   motor = stop
```

You are writing powerful programs, but they remain easily readable. Variables can be binary numbers, so in the example above it would also be possible to say:

```
   forward = %01
   reverse = %11
   stop = %00
```

although I would reserve binary patterns for more complex tasks. For example, a program to control a set of flashing disco lights could use binary numbers like this:

```
   LET lights CONTROL PR
 INTER (0) TO PRINTER (7)
      lights = %10000001
      lights = %01000010
      lights = %00100100
      lights = %00011000
```

Remember too that the input lines can be read. For example; if there is a pressure pad attached to line 0 of the user port:

LET pad READ USER (0)

will set the variable 'pad' to report on the state of that line, and:

pressed = LOW

allows us to set up this conditional statement which MCL lets us present in almost perfect English:

IF pad IS pressed THEN. . .

Loops in MCL

The MCL language has a great variety of loop structures. REPEAT. . . UNTIL is available, as is WHILE. . . ENDWHILE and LOOP . . . ENDLOOP. The latter command is interesting because in its normal state, the loop is infinite. To set a particular number of loops then LOOP n has to be used. For people familiar with Basic, the FOR. . .NEXT loop is also available.

All the loop structures are emphasised on screen in various colours, and are also automatically indented. This makes MCL programs very readable. Syntax errors are also highlighted by a built-in checker. This is very useful for beginners, though it doesn't point out errors in logic. Such limitations are not going to be solved easily.

Control flow

It's easy to control the logical flow through an MCL program, due to the ease of use of the REPEAT and WHILE statements. MCL also has a range of other conditionals, IF and CASE IF. IF is laid out like this:

IF condition THEN do1 ELSE do2

The ELSE part is optional. CASE is similar to the Basic 5 and Comal constructions:

```
   CASE
      WHEN condition1 DO
action1
      WHEN condition2 DO
action2
       ::       ::       ::
   ::
      WHEN conditionN DO
actionN
      OTHERWISE DO alt_ac
tion
   ENDCASE
```

The last major conditional is the innovative WHENEVER construction, which enables a rudimentary level of interrupt to be slotted into a high level language.

WHENEVER condition DO action allows the action to be carried out when a button is pressed or a temperature falls for example. Note that more than one WHENEVER command can be operational at once. To cancel all of them, use an an ENDWHEN command.

Sound, graphics and input

Sound in MCL duplicates the BBC Basic SOUND statement with a BEEP command. So BEEP 1 gives a beep for a twentieth of a second. BEEP d,p,v selects duration, pitch and volume, and is analogous to setting an envelope. The next BEEP 1 will beep for a twentieth of a second using the last pitch and volume values.

Graphics are limited to actions on a mode 1 screen, as demonstrated in figure 3. The commands JOIN and PLOT allow crosses and lines to be drawn on a co-ordinate screen with great ease, ideal for data logging. But the graph has preset axes, and so some scaling generally has to take place. Whether beginners are up to this is an interesting question; my feeling is that people who are making good use of this facility will also be looking towards filing the data too, and consequently will have to progress past MCL.

Keyboard input is a particularly poor feature in MCL. I appreciate the approach taken, but redefining ASCII codes is not good practice. The ASCII code will be around for a while, and learning how to use it allows skills to be transferred to later experiences. This is a serious fault.

Up to speed

Figure 4 shows the speed of MCL in comparison to Basic in six tests. They are not uncommon tests of speed, but have been tweaked from the originals to use the features most common in control measure programming. In everything but loops, Basic is three to five times faster. If you'd like to try the tests yourself (you will need the MCL ROM) then the programs are in yellow pages.

To get a feeling for MCL programming I've included a few other programs: a simple reaction tester, a more complex reaction tester which produced the graph of figure 3, and a Ferris wheel fairground program. This is best explained in collaboration with figures 5, 6, 7 and 8, which explain how the hardware and software fitted together. One thing is worth pointing out: the less accurate the mechanical construction of a model, the more rigorous the programming has to be to control it and take account of slack and slippage in the mechanism position.

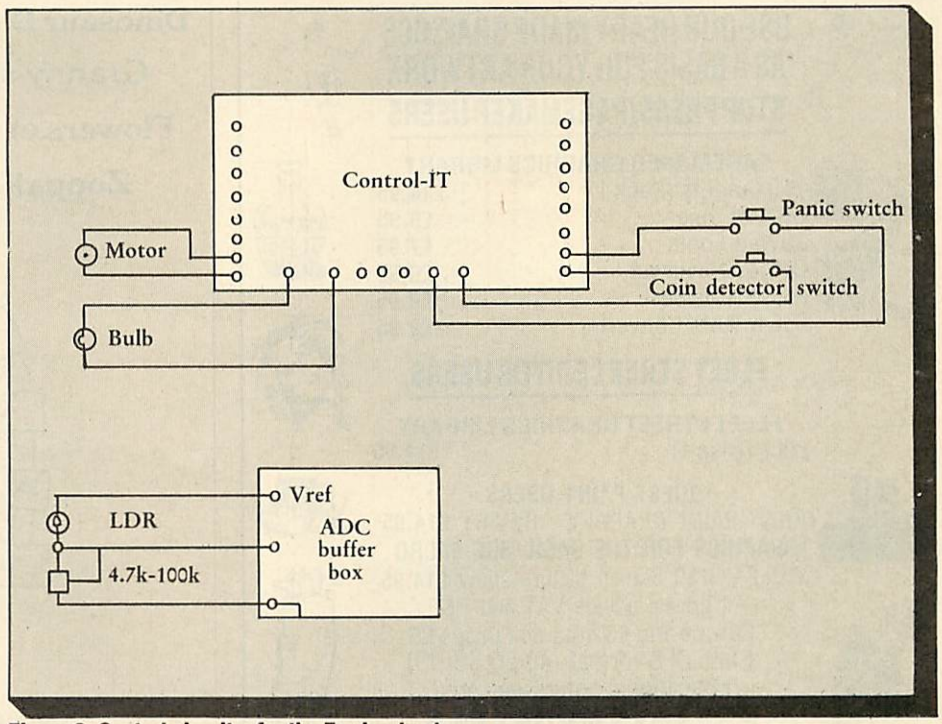


Figure 6. Control circuitry for the Ferris wheel

OUTPUT DEVICE	OPTIONS	MCL LANGUAGE
Motor	Stop	LET motor CONTROL printer(0) TO printer(1)
	Fwd	LET stop = 0
	Bwd	LET fwd = 1
		LET bwd = 3
INPUT DEVICE	OPTIONS	
LDR	Dark	MCL LANGUAGE
	Light	LET ldr CONTROL adval 1
		LET dark = 1000
Coin	In	LET light = 3000
		LET coin READ user(0)
Panic	Pressed	LET in = LOW
		LET panic READ user(1)
		LET pressed = low

Figure 7. Ferris wheel logic table

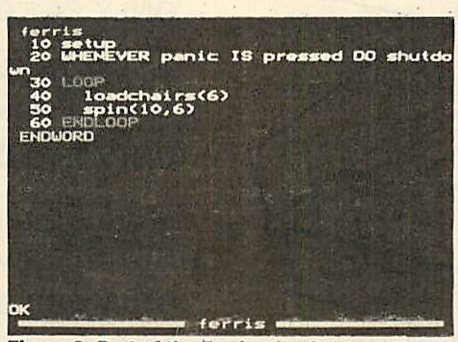


Figure 8. Part of the Ferris wheel program

MCL is fast. It's sufficiently Logo-like not to be too daunting to young children. It's sufficiently Basic-like to interest any secondary teachers still involved in Basic programming. Its method of accessing control lines using named variables is extremely powerful, and it has a full range of control-specific commands. And at around £29 it's reasonably priced and easy to learn!

However, the lack of definable functions, file handling, real numbers and strings means that it can never be the powerful multi-purpose language exemplified by Basic, Comal, or Logo. If general purpose learning is what you're after, then Logo microworlds can model this language, but about five times slower and without the WHENEVER context switching facility.

If you want to do some short term computer based control and you feel that your programming skills are weak, then MCL could be for you.

Full details of Joe's listings can be found on the yellow pages index, page 113.

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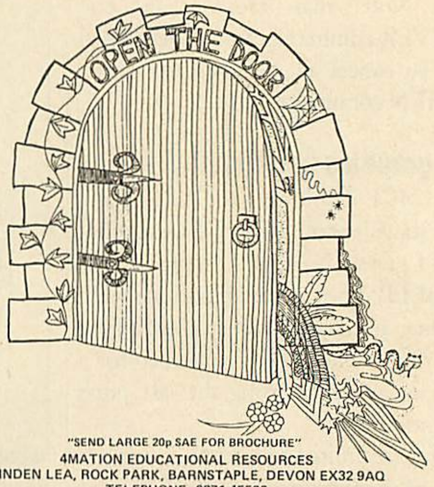
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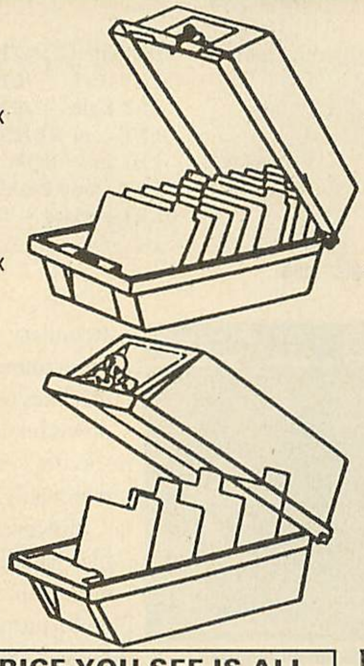
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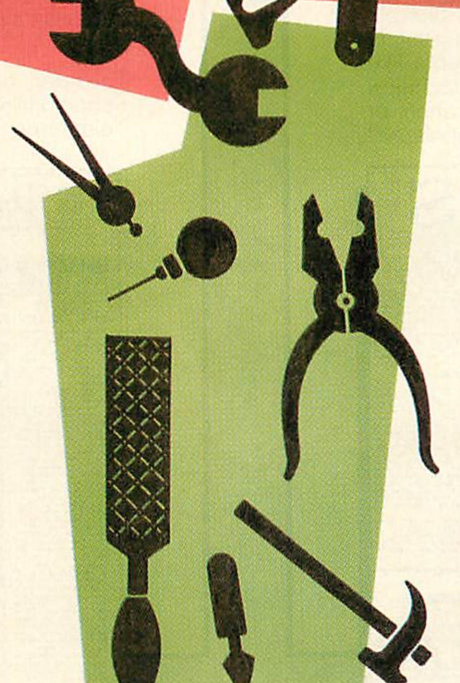


ILLUSTRATION BY ANDREW MacCONVILLE

Too often people are put off writing ROM software because of the complexity of the coding required. Getting to grips with the ROM header and the extra code necessary for decoding the star commands is too much for most. Even after reading the *Advanced User Guide*, you might still be unsure what a ROM type-byte is, or how to write an Oscli command handler. Instead, most people write machine code utilities that reside in main memory (usually pages &09 and &0A) and load them in from disc when needed, using the *RUN command. If you are one of these people, then you may well be interested in the subject of this article – the *AutoROM* program. It won't help you to write ROM headers, although you may learn how to from looking at the way the listing does it, but it provides a quick and simple way of building up ROMs full of useful utilities.

You may consider using the ROM Filing System (RFS) to load programs from ROM, however it is quite slow and also involves a filing system change to access the programs. You have to change to the RFS with *ROM, then *RUN the utility, then change back to your normal filing system. With Master series it would be possible to shorten this to a single command of *-ROM-PROGRAM or even to use:

*-ROM-LIBFS
*PROGRAM

The ROM-LIBFS sets the ROM filing system to be the library filing system. In other words, when an unrecognised star command is used, first of all the normal, current filing system is examined, then the library filing system is checked to see if it holds any programs of that name. However, don't forget that the RFS is still very slow. *AutoROM* actually works rather like a minature RAM disc and has its own star commands, it is therefore very much faster than the RFS, and utilities can be run from *AutoROM* using just a single star command to call them.

Entering the program

The listing for *AutoROM* can be found on the yellow pages. Type in listing 1 and save it before running. You can call the program anything except 'AutoROM', as when you run it the program saves its machine code under that name. Now run the program. After assembling, a number of checksums are calculated – if you have made any errors you will be told, and the area of the program to check will be given. Look through that section very carefully and

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correct the errors, then re-save and re-run the program. Once all is well, the machine code will be saved.

If you are using Basic 2 or above, you can make use of the assembler directives EQUB, EQUW and EQUS; delete all references to '+D%', change the save routine to:

```
OSCLI ("SAVE AUTORO
M 6000 "+STR$~O%+" 800
0 8000")
```

and change the assembling FOR loop to:

```
FOR I%=4 TO 6 STEP 2
P%=&8000 : O%=&6000
```

This makes use of the 'offset assembly', feature of Basic 2.

Using the program

Once the machine code is saved, it can be used as a ROM image. The ROM must be loaded into a spare sideways RAM bank. On the Master series use:

*SRLOAD AutoROM 8000 x Q I

where x is 4, 5, 6 or 7 depending on which RAM bank you have spare. Master 128 users mustn't use I at the end of the line, and do need to press CTRL-Break to initialise the ROM. On a Compact, the ROM is initialised automatically. Beeb users should refer to their sideways RAM user guides on how to load the ROM. The command will normally be something like:

*RLOAD AutoROM

You *must* now enter *CLEAR; this initialises *AutoROM* and clears out any spurious data in the rest of the RAM bank. The ROM will not function correctly if it is not cleared immediately after loading it.

Once loaded and cleared, you can type *HELP. Among the list of ROMs you should see:

AutoROM 1.0

A similar message is given if you use *ROMS on a Master series micro.

To see the list of *AutoROM* commands to, type *HELP AUTOROM. This can be abbreviated to *H. AU. These commands are listed in figure 1 over the page.

AutoROM can be used to store other machine code utilities – the sort you normally keep on disc and run with a star command. You can store up to 16 files in the *AutoROM*, and you have just under 14 kilobytes free. If you type *DATA you will be told the exact number of bytes of memory left. At the start this is &3700.

The rest of this article refers to two utilites, *PHONE and CHECK; you will find source listings for these on the yellow pages too. These are provided for you to try

BOX 1: VARIABLES AND LABELS

.start	Standard ROM header
.service	Service ROM calls 4 and 9. (Unrecognised * command and *HELP)
.error	Generate an error, text is pointed to by X and Y
.mess	Print a message, text is pointed to by X and Y
.savezero	Preserve the contents of some zero page locations in sideways RAM
.loadzero	Restore zero page from SWR
.hex	Display contents of 'A' in hexadecimal.
.help	Deals with *HELP, if just *HELP, then only the name displayed, otherwise text after *HELP is compared to 'AUTOROM' and if it matches (or is abbreviated by '.') .bighelp is called
.out	Exit from ROM, but do not claim call
.bighelp	List commands display header message and list out the file names. .hdone prints a newline only if not already on the end of line
.spcs	Displays 'Y' spaces (ASCII 32)
.bmove	Move an area of memory length 'len', starting at 'from' to 'to'
.starcom	Code to test for a valid star command
.com1	Check through .coms command list. If command is found, next two bytes in table contain address of command handler, so use an indirect jump to it. 'Y' points to next textual character after the command
.nocom	Wasn't an *AutoROM* command, so it was the name of a cached file?
.none	Wasn't a cached file so exit ROM
.indok	Was cached file, copy index info and block move file. Restore registers and JSR to code. Restore registers and exit ROM, claiming service call
.comout	Exit ROM, claiming call
.clear	*CLEAR code. Clear index page to 0, set all pointers to mean empty ROM and calculate amount of free memory
.data	*DATA code. If files exist print header message then the file names padded out to eight characters followed by the load, exec, size and addr information
.sdone	Display free space and message
.pdata	Print two spaces followed by hex value of index,Y and index+1,Y
.cache	*CACHE code. Display syntax message if no file name given. Transfer file name elsewhere, use Osfile to open the files to see if it exists, check the length Osargs and then close it with Osfile
.nofile	Error: file didn't exist
.toobig	Error: file was too long to be stored in the ROM
.noroom	Error: the index was full (16 files)
.ok	File existed, wasn't too big and <16 files cached, so load it with Osfile, transfer info to index and for block move into SWR. Work out memfree and do block move
.fret	Find a suitable name for file, strip pathname off, and truncate
.mname	Move name into index
.mndone	Name moved, update pointers ready for next file
.scrap	*SCRAP code. Display syntax message if no file name given
.doscrap	Look for name in index
.notthere	Name couldn't be found – JMP .nofile
.compok	Name found. Move pointers and if not last name, shuffle files back
.justdel	Calculate free memory and clear rest of index to zero
.hlptxt	and onwards are all the messages and errors displayed followed by the command table.
.zero	Used to save an area of zero page
.tmp	General work space
.memfree	Amount of free memory (in bytes)
.iptr,.ind	Used as pointers into the index
.num	Number of entries in the index
.count	General work space
.optr	Copy of &F2 text pointer
a,x,y,p	Used for saving 'A', 'X', 'Y' and 'P'

out the facilities of *AutoROM* but of course you can go ahead and install your own programs instead. Enter both listings, save them and run them. You should now have two files called PHONE and CHECK on your disc. To see what they do, try entering the following:

```
*PHONE
*CHECK HELLO
*CHECK MADAM
```

Loading files into AutoROM

*CACHE is the command that stores files in the *AutoROM*. It takes a file name as a parameter. It first loads that file into the machine at its usual load address, and then stores it in the *AutoROM* along with its name and file information. You can use full ADFS or network pathnames when loading files, but filenames are truncated to eight characters as they are stored. For example, if you type *CACHE $.FRED.UTILS.RE LOCATOR
the file 'RELOCATOR' would be stored by *AutoROM*, but it would be called 'RELOCATO'. So, to store the two utilities created above, you would type:

```
*CACHE PHONE
*CACHE CHECK
```

You can now run either of these utilities as before, by typing *PHONE for example. They will be downloaded from the ROM, rather than loaded in from disc. To see this in action, remove your disc and try the three examples above.

There are two ways of finding out what utilities are loaded into the ROM. One is to use *DATA, as in figure 2. The other is to use *HELP AUTOROM. If you try it now, the *AutoROM* commands will be listed as before, but the files will have been added as in figure 1.

The files are listed in the order that they were *CACHED, not alphabetically.

When using *CACHE, if the file you try to load cannot be found, or if it's too big to fit into the ROM or there are already 16 files cached, then an error will be generated to describe the problem.

*SCRAP is used to delete utilities from ROM. It takes a simple filename as a parameter and deletes that file from the ROM if it existed. If the file doesn't exist, an error will be generated. *SCRAP automatically shuffles the files in ROM like *COMPACT in ADFS, in order to maximise the amount of free space in the ROM. So if you typed *SCRAP PHONE, the file CHECK would be shifted up the memory to the start of the ROM.

*CLEAR initialises the *AutoROM*. It is

BOX 2: THE INDEX BLOCK

8800–8807	Name of first file	
8808–8809	Start address of file in ROM	
880A–880B	Load address of file	Stored low byte, high byte
880C–880D	Call address of file	
880E–880F	Length of file	
8810–8817	Name of second file	
8818–8819	Start address of second file in ROM	Repeated for all 16 files
" "	" " " "	
" "	" " " "	
" "	" " " "	

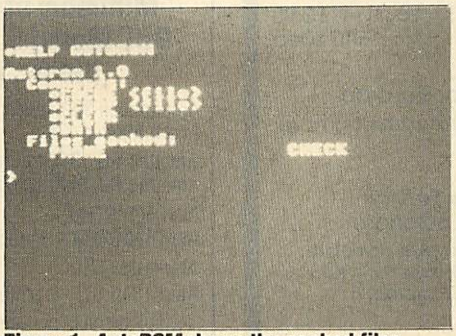


Figure 1. ***AutoROM* shows the cached files**

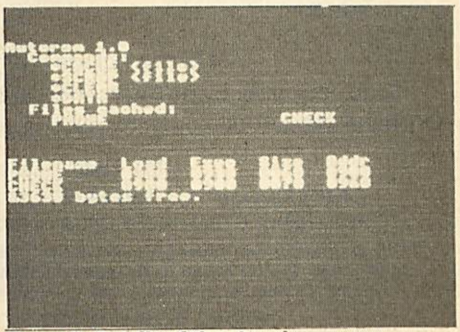


Figure 2. Details of the stored programs

rather like the disc filing system's *DESTROY command. It must always be used immediately after loading an 'empty' *AutoROM*. It gets rid of any rubbish left in the sideways RAM from a previous ROM image stored there.

*DATA tells you how much memory is left for files in the ROM. If you have files loaded, it will also tell you their names, load addresses, execution addresses, and their position in the *AutoROM*. So if you tried *DATA after caching PHONE and CHECK, the information shown in figure 2 would be shown.

Now try

```
*SCRAP PHONE
*DATA
```

and notice that CHECK's 'Addr' is now 8900, as the stored file is shuffled down to save space in the RAM.

It is important to note that, when you're loading files into *AutoROM*, *CACHE first loads the file into normal memory. So its vital to make sure this will not interfere with what you are currently doing. If a utility file normally loads and runs at &900, then it will do so with *CACHE. Another important feature is that complete, full, *AutoROMs* can be saved and loaded as normal ROM images. So after building up an *AutoROM* you could save it for later use. On a Master or compact use:

```
*SRSAVE ROM1 8000 x Q
```

or use your normal ROM dumping routine. Doing this means you can load in the ROM image – and have all your machine code utilities ready to go.

Technical details

All the files cached in *AutoROM* are stored in one block from address &8900 onwards. There are no file separators and no 'sectors' like in DFS. Instead, there is a one page index at &8800 that contains all the names and file address information for the files. This is rather like the two sectors used for the catalogue on a disc. You can see the format of this index in box 2. Notice that the file addresses are only stored to 16-bit precision. The *AutoROM* can't load files into a second processor, so there is no need for the other 16 bits. Only utilities that run in the host (I/O) processor can be used. All the ROM header and command handling code is stored below this catalogue page, with about 350 bytes left spare for you to use with your own enhancements.

Using *AutoROM*, you can collect together all those often-used machine code utilities into a single customised toolkit ROM. Suitable software tools are often printed in Acorn Forum – the *CHEAT and *BINARY featured in January for example. The whole collection of tools can be saved as a ROM image and only loaded when required. You could keep a number of different toolkits of utilities on disc, for programming, wordprocessing and so on, loading in the appropriate one for each task.

Turn to page 113 for details of the listing.

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ARC WINDOWS WITHOUT PAIN

The Arc's huge potential for using windows, icons, menus and pointers can be accessed simply from Basic

Chris Adie

One of the most exciting developments incorporated in the Archimedes micros has been the 'WIMP' system – the use of windows, icons, menus and pointers to represent a simulated 'desktop'. The Apple Macintosh has been the major force in popularising this way of working, and the MS-DOS world has followed Apple's lead, with the GEM and MS Windows environments. The Archimedes Desktop program on the Welcome disc shows that Acorn is also following the trend towards easier-to-use software.

What you may not have realised is that the Desktop is written in Basic! All the window handling, the pop-up menus and so forth are *controlled* from Basic, but actually *performed* by part of the Arthur operating system called the Window Manager. This division of work between the program and the operating system means that it is easy to write your own programs which use windows – much easier than in GEM, MS Windows or on the Macintosh! This article explains how your software can take advantage of this state-of-the-art user interface.

The SYS statement

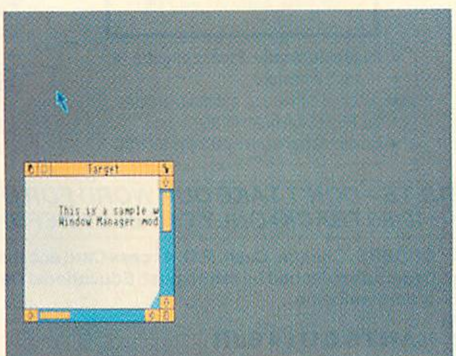
We'll make a lot of use of the Basic SYS statement in this article. SYS was introduced in Basic 5 on the Archimedes as a way of calling the operating system. Most of the familiar BBC operating system routines, Osbyte, Oswrch and so on, can be called using SYS, although they can also be called in the old way too. SYS is a more sophisticated version of CALL.

When Basic finds a statement like

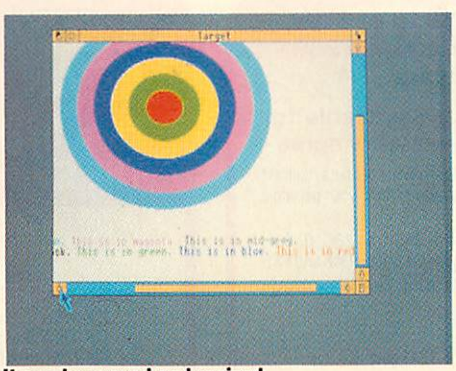
```
10 SYS 6,A%,X%,Y% TO
result%
```

it will copy A% to processor register R0, X% to register R1, Y% to register R2, and then execute a software interrupt (SWI) instruction, type 6. An SWI is an ARM machine code instruction which causes control to be transferred directly to the operating system. What happens then depends on the type of the SWI. Type 6 is equivalent to Osbyte, so the operating system performs the appropriate operation and then returns to the machine code instruction following the SWI. The Basic interpreter stores the value of R0 returned by the operating system in the variable result%, and goes on to the next statement in the program.

There are over 16 million possible SWI types, but only a very few of these are defined. The Window Manager uses 24 SWI types, starting with type &400C0 but we'll be dealing with only a few of them.



Listing 1 produces a simple window



It can be moved and resized

One problem with SYS is that only the first eight of the ARM processor's registers can be accessed. When you have more than eight 32-bit words of information to pass across, you must use a parameter block – an area of memory pointed to be one register, usually R1, which contains all the data for the operating system routine, and where the routine will store any output values before returning. So for example you could have

```
DIM block &300
SYS poll,0,block TO r
eason%
```

where 'poll' is one of the Window Manager SWI types.

A single window

Listing 1 on the yellow pages is a short program which creates a single window on a mode 12 screen. It's important to realise we are talking about scrollable 'desktop' windows here, not the usual graphics and text windows defined with VDU 24 and VDU 28. When we need to talk about the VDU 24 graphics window, we'll call it the 'clip rectangle', since any graphics performed outside that region don't appear on the screen. The example window drawn by the program contains concentric coloured rings together with some text, and it has a title bar, full box, horizontal and vertical scroll bars and a size box. You can move the window around the screen, scroll and re-size it, and when you click on the close box the program terminates. We'll go through the program step-by-step so you can see what all the routines do.

With Arthur version 0.2, not all of the characters above ASCII 127 are pre-programmed with the shapes required by the Window Manager. If you still have version 0.2 then you'll have to add the

PROCdefinewimpcharacters. PROCsysvars defines the various Window Manager SWI types.

Before you can make any Window Manager calls, you must initialise the WIMP system with SYS init. This statement also has the effect of VDU 5, and all the text output to windows must be done in graphics mode. After that, there are two stages in preparing a window for display on the screen – first you create it, then you open it.

Creating a window is done with

```
SYS createw,0,block T
O handle%
```

where createw=&400C1. From now on, I'll not refer explicitly to the SWI numbers – you can get them from PROCsysvars in the listing. The creation routine returns an integer called the window handle, which uniquely identifies the window. It is used in most other Window Manager calls. In many ways it's like a familiar file handle. The parameters block passed to createw contains quite a lot of information about the window. It controls features like the size and colour of the window – all the parameters are shown in tables 1 and 2.

Physical work area

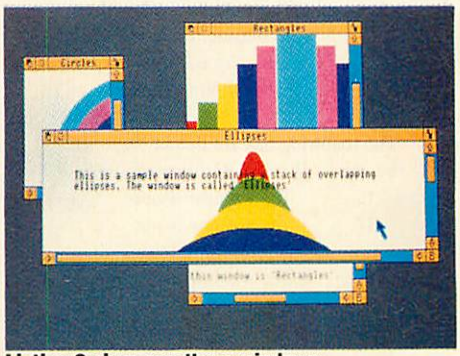
The physical work area (PWA) of a window is the part of the window containing information – it excludes the scroll bars and title bars. You can specify the position of the window on the screen by giving the co-ordinates of the lower left and upper right corners of the PWA, relative to the normal graphics origin at the bottom left-hand corner of the Archimedes screen as shown in figure 1.

Usually, the physical work area displays a small part of a larger work area, and the PWA can be moved around this larger logical work area (LWA) using the scroll bars and arrow icons. Figure 2 shows how the LWA and PWA relate to each other. We specify the size of the LWA in the parameter block for createw by giving the minimum and maximum X and Y values measured from point called the LWA origin. This must be in the LWA. In the Desktop program the LWA origin is at the top left corner of the LWA. This has the disadvantage that Y values within the LWA measured relative to the LWA origin are negative. So in the yellow pages programs the LWA origin is at the bottom left corner of the LWA, at the graphics origin. The LWA min X and LWA min Y are both set to zero.

The positions of the scroll bars control

block!0 to block!12	Initial co-ordinate of window's physical work area (where first appears on the screen)
block!0	PWA min X
block!4	PWA min Y
block!8	PWA max X
block!12	PWA max Y
block!16	Initial X scroll bar offset
block!20	Initial Y scroll bar offset
block!24	Handle of window under which to create this one (-1 if on top)
block!28	Window flags (see Table 2)
block?32	Window title foreground colour
block?33	Window title background colour
block?34	Work area foreground colour
block?35	Work area background colour
block?36	Scroll bar background colour
block?37	Scroll bar foreground colour
block?38	Title bar highlight colour
block?39	Reserved by Acorn
block!40 to block!52	Logical work area co-ordinates
block!40	LWA min X
block!44	LWA min Y
block!48	LWA max X
block!52	LWA max Y
block!56	Icon flags for title bar
block!60 to block!68	Reserved by Acorn
$(block+72)	Title string (up to 11 characters, terminated by CR)
block!84	Number of icons in this window
block!88 onwards	Icon data is stored here

Table1: Parameter block for createw



Listing 2 gives you three windows

which part of the LWA appears in the PWA. The scroll bar positions are given by two numbers which are the co-ordinates of the top left of the PWA, relative to the LWA origin – this may explain why the Desktop program puts the LWA origin where it does!

Opening a window is easily done by calling the Window Manager's openw routine with the SYS statement:

```
SYS openw,0,block
```

where the parameter block is set up as shown in table 3. If you don't know what values to fill the block with, you can use:

```
block!0 = handle%
SYS getw,0,block
```

to set the block up ready for openw. This opens the window in its last known position on the screen.

WIMP events

The biggest difference between a program using windows and a conventional program is that in the first case, the user is in charge of what happens next, not the programmer. You can move, scroll and resize windows, click the mouse on objects in the windows, or make keystrokes. The program must know what to do in all these circumstances, though it may of course choose to ignore some of them. The main loop at the heart of a program using the Window Manager reflects this situation:

```
REPEAT
    Wait for the user to
        do something
    Take appropriate action
UNTIL finished
```

To find out what the user has done, you use a routine called poll. The only input in the parameter block to poll is a 'mask' indicating the actions you don't want the user to be able to do – if it is 0, everything is allowable. On leaving poll, register R0 contains the kind of action which took place, and the parameter block carries information specific to that action. These actions are called 'events', but they are not the same as 'events' on the BBC micro – those can only be used from machine code.

There are 10 possible values returned by poll, as shown in table 4. The information returned in the parameter block for each is shown in table 5.

Event 0 is easy – the user hasn't done anything, and we don't need to do anything either, unless you have an animated display to take care of, like the clock in the Desktop for instance.

Event 2 (open window request) informs us that the user has brought a window to the top of the stack of windows by clicking on the title bar, or that the window's size has changed or scrolled. Usually, a sufficient response to event 2 is to call openw with the parameter block passed back by the poll.

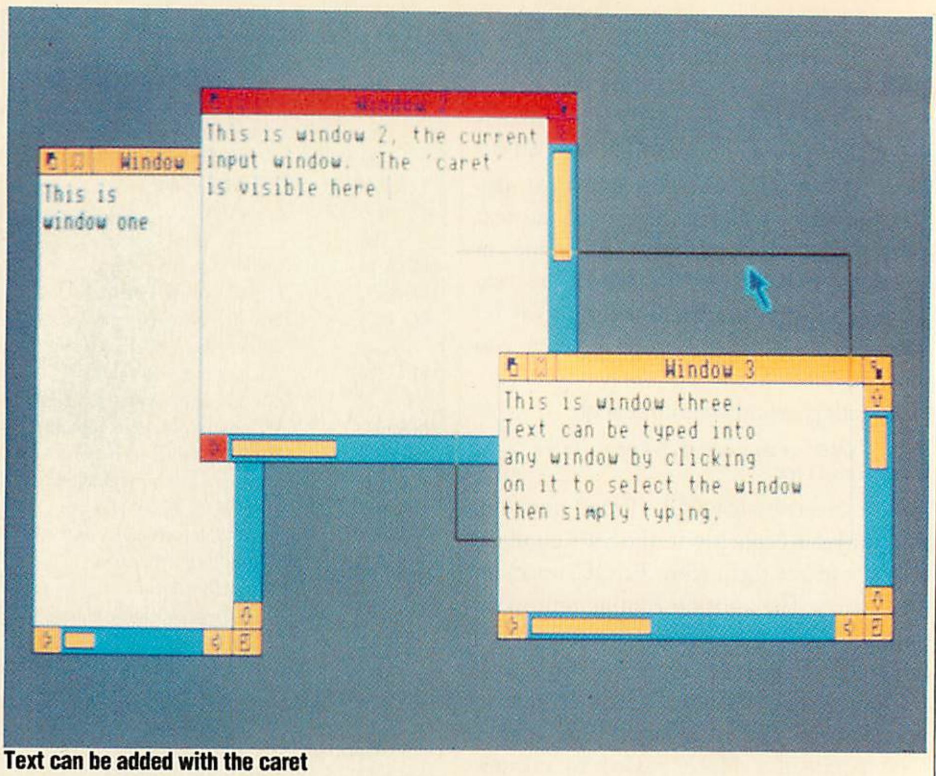
The openw routine by itself does not result in anything actually being drawn on the screen. A call to openw will usually result in all or part of the window and its borders needing to be redrawn, so openw generates event 1 (redraw window request) before it returns control to your program. You must respond to this event 1 in a very definite way, using the following code:

```
    SYS redraww,0,block T
O more%
    WHILE more%
        PROCredrawwindow
        SYS getr,0,block
TO more%
    ENDWHILE
```

The routine redraww works out a list of invalid rectangles, which cover the visible parts of the window which need updating. It then redraws the title bar and scroll bar where these intersect with the list, and finally it indicates to your program whether part of the PWA needs updating by returning a flag in register R0. The parameter block returned by redraww is shown in table 6. The VDU 24 graphics clip rectangle is set to the co-ordinates at block! 28 to block! 40, and your PROCredrawwindow routine takes responsibility for drawing the appropriate graphic or text in that rectangle. The process is repeated for all rectangles in the invalid list, using routine getr to get position parameters for each in turn, until the more% flag returned in R0 becomes FALSE. Note that more than one window's PWA may need updating, so PROCredrawwindow needs to pay attention to the window handle returned in block!0.

The above sounds an incredibly complicated procedure for doing something which is in reality quite easy to understand. A couple of examples will probably make things clearer. Diagram 3 shows what happens when a window which is overlapped by two other windows is brought to the top, by clicking on the title bar. First of all, you get event 2 (open window request) from poll, so we call openw. We then get event 1 (redraw window request), and so we call redraww, which draws the parts of the border which were hidden by the other windows. Redraww passes back the co-ordinates of invalid rectangle A, which you draw in, and then we call getr. This passes back the co-ordinates of rectangle B, so we draw in there too, and call getr again. But this time getr returns a more% value of FALSE showing there are no more rectangles. So you go back to calling poll. Notice that redraww clears all the rectangles to the window background colour, ready for you to draw on.

Diagram 4 shows what happen when you scroll a window which is partially overlapped by another window. The poll routine returns an open window request event, and you call openw. Poll then gives you a redraw window request event. You call redraww, which draws the scroll bars in their new position and copies those parts of the physical work area which will re-



Text can be added with the caret

Bit	Meaning if bit set
0	Window has a title bar
1	Window can be moved
2	There is a vertical scroll bar
3	There is a horizontal scroll bar
4	The window can be redrawn by Window Manager (ie, it contains icons only)
5	The window is a 'pane' in another window
6	The window is allowed to go outside the screen
7	There are no 'send-to-back' or 'close' boxes

The following bits are output flags, set by certain Window Manager routines.

16	The window is open
17	The window is not covered by another
18	The window has been toggled to full size

Table 2: Window flags

block!0	Handle of window
block!4 to block!16	Co-ordinates of Physical work area
block!4	PWA min X
block!8	PWA min Y
block!12	PWA max X
block!16	PWA max Y
block!20	X scroll bar offset
block!24	Y scroll bar offset
block!28	Handle of window which this one is behind (-1 if it's on top)

Table 3: Parameter block for openw and getw

Event code	Meaning
0	Nothing has happened
1	A window needs redrawing
2	A window needs (re)opening
3	A window close box has been clicked on
4	The pointer is leaving a window
5	The pointer is entering a window
6	User has pressed or released a mouse button
7	User has finished a drag box operation (after SWI drag)
8	User has pressed a key
9	User has selected a pop-up menu item

Table 4: User event codes returned by poll

User event	1	2	3	4	5
block! 0	Handle	Handle	Handle	Handle	Handle
block! 4		PWaminX			
block! 8		PWaminY			
block!12		PWamaxX			
block!16		PWamaxY			
block!20		ScrX			
block!24		ScrY			
block!28		Under			

User event	6	7	8	9
block! 0	MouseX	DrgminX	Handle	Mainitem
block! 4	MouseY	DrgminY	Icnhandle	Subitem
block! 8	Newbut	DrgmaxX	CaretX	
block!12	Handle	DrgmaxY	CaretY	
block!16	Icnhandle		Key	
block!20	Oldbut			
block!24				
block!28				

Table 5: Parameter block data returned by poll

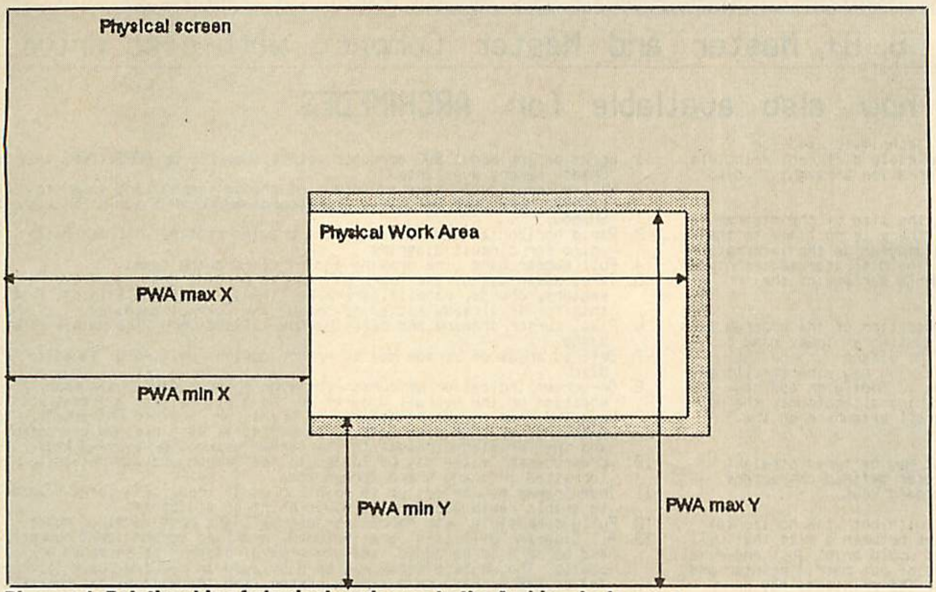


Diagram 1: Relationship of physical work area to the Archimedes' screen

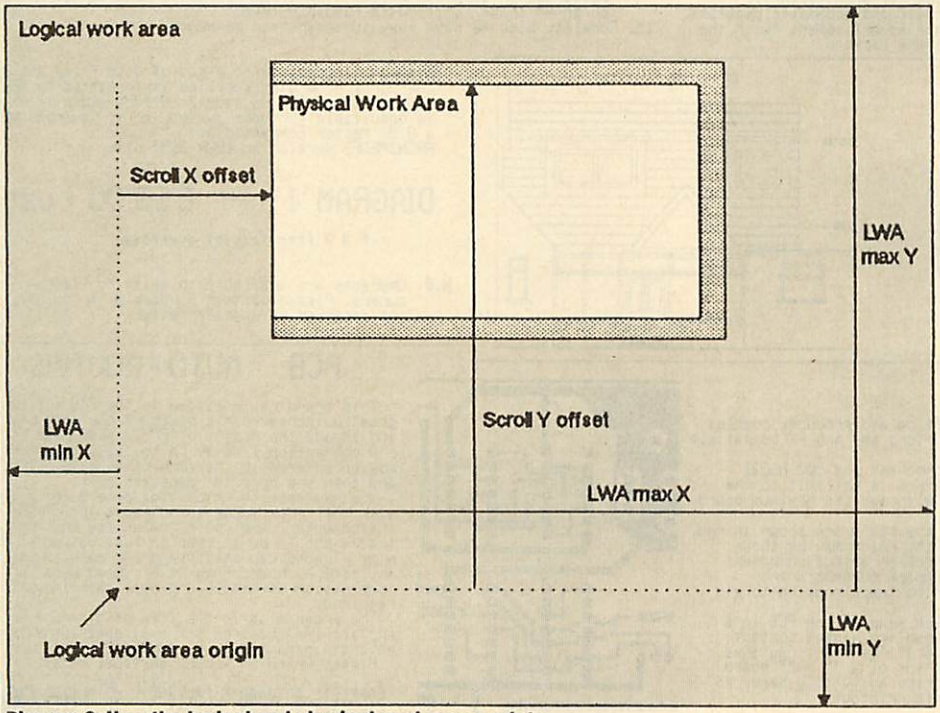


Diagram 2: How the logical and physical work areas relate

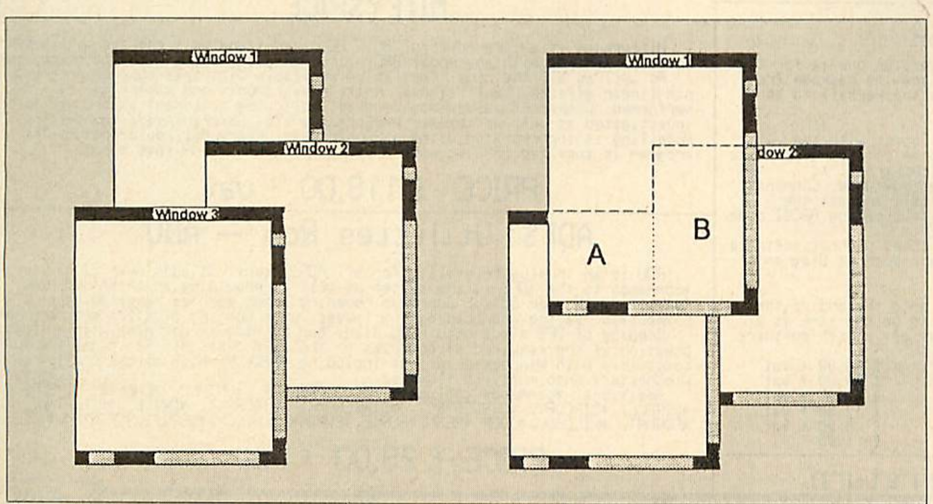


Diagram 3: On the left, window 1 lies underneath, so when it is brought to the front (right), rectangles A and B need redrawing

main visible to their new location. It returns the co-ordinates of rectangle A, which you then draw in and call getr for the co-ordinates of rectangle B. Having drawn that in, getre indicates no more rectangles, so you can go back to calling poll. You can see that in this case you don't need to redraw any part of the house, because it does not appear in any of the invalid rectangles.

If you like, try to work out what happens when you go from the situation in diagram 3 – in other words when the user clicks on the 'send to back' box in window 1. Remember that events tell you which window they are concerned with, by including the handle in the parameter block information returned by getr.

When the user clicks on the close box of a window, event 3 (close window request) is passed back by poll. You call the closew routine with the appropriate window handle in block!0. If necessary you will get open window and redraw window requests when you go back to calling poll, for windows revealed from underneath the closed one.

Text and graphics

ROCredrawwindow and PROCdraw in listing 1 show how to put text and graphics in a window. In fact, for this simple program, the entire LWA is redrawn for each rectangle that we are passed by redraww and getr, but since the graphics clip rectangle is set, only the rectangle in question is actually updated.

The first thing to do is to find out where the LWA origin is, relative to the graphics origin at the bottom-left corner of the screen. Diagrams 1 and 2 show that you can calculate this from the PWA co-ordinates and the scroll offsets. All text and graphics to be drawn in the window must be drawn relative to the LWA origin, so that scrolling will have the correct effect. The obvious way to do this is to move the screen graphics origin to the LWA origin while we do the drawing, and move it back afterwards, but unfortunately this leads to problems. In PROCdraw in listing 1, you must add the LWA origin co-ordinates to every graphics co-ordinate in the LWA.

Remember that VDU 5 mode is always in effect, so that text as well as graphics is limited to the graphics clip rectangle. You must position the graphics cursor using MOVE before using PRINT, and you can't use Return for a new line, because that will move the graphics cursor to the left-hand edge of the current clip rectangle, not at all what you want.

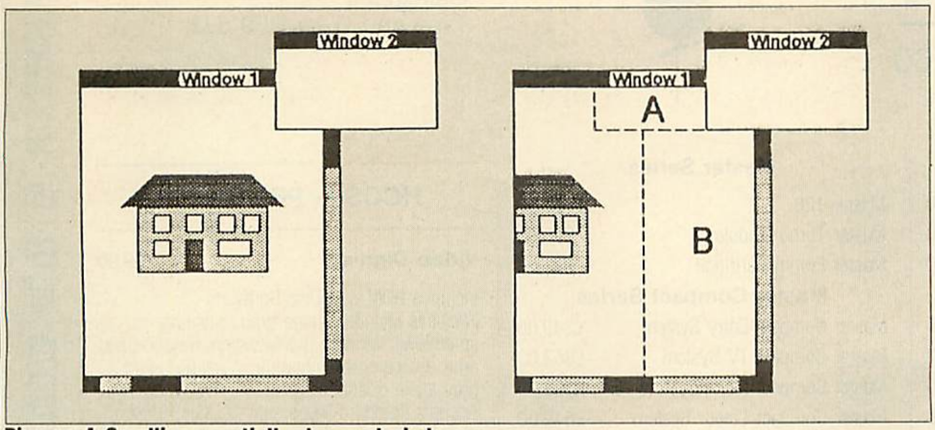


Diagram 4: Scrolling a partially obscured window

Multiple windows

Having typed in listing 1, relatively few changes are required to get to listing 2. This displays three windows containing circles, ellipses and rectangles. You simply have an array, window%(), to hold the window handles, and another array, windows$(), to hold the window titles. PROCredrawwindow works out the name of the window to redraw and calls FNdrawcircles, FNdrawrectangles or FNdrawellipses appropriately. You can increase the number of windows (controlled by 'maxindex') up to 32, so long as you prove a suitable drawing routine for each. The structure of the program is quite independent of whether you are using two or 32 windows.

Text entry

The Desktop program has a 'notebook' window, which you can type into. Typed characters appear at the position of a text cursor, shaped rather like an elongated capital I. This is called a 'caret', and there are two special routines in the Window Manager for dealing with it.

The first of these routines is setcaret. It doesn't use a parameter block. Instead, all the information is passed in registers. The call to setcaret is typically like this:

```
SYS setcaret,handle,-
1,X,Y,&1000024,-1
```

where X and Y give the required position of the caret relative to the window's LWA origin. The three parameters which are given explicit numeric values have to do with the size of the caret and whether it is associated with a particular icon.

A call to setcaret results in the window title bar changing colour, to that specified in block?38 in the original call to createw, and the caret being drawn in the indicated position (providing that the position is within the visible PWA). The window now has the 'input focus' – in other words a key pressed event (poll event 8) will pass back

block!0	Handle of window
block!4 to block!16	Co-ordinates of physical work area
block!4	PWA min X
block!8	PWA min Y
block!12	PWA max X
block!16	PWA max Y
block!20	X scroll bar offset
block!24	Y scroll bar offset
block!28 to block!40	Co-ordinates of rectangle to draw
block!28	min X
block!32	min Y
block!36	max X
block!40	max Y

Table 6: Block from redraww, getr and updatew

JARGON BOX

Window – A discrete area of the screen used to display information. There may be several on the screen at once.
Icon – Small picture on the screen which causes some action when the mouse button is clicked on it.
Close Box – Clicking on this icon removes a window from the screen.
Full Box – An icon which enlarges the window to full screen size.
Scroll Bar – Device on the side of the window to let you change the view through the window.

the handle of this window and the caret position in the parameter block. A setcaret call to another window will erase the caret from the window with the current input focus and reset the title bar back to normal before putting the caret in the newly selected window.

Listing 3 is a program which displays three windows. You can click the move in a window work area and type in your own text, rather like the Desktop notebook. If you've already typed in listing 2, the changes you'll need to make are minor. The text for all the windows is stored as a two-dimensional array of 80-character strings. In PROCwritetext, which writes out the text when a redraw window request is received, this program actually pays attention to the rectangle it's being asked to redraw, and it only writes out those characters which appear in that rectangle. This speeds things up enormously compared to writing out the entire text every time.

When a key pressed event is detected by poll, PROCkeypressed places the character in the text array, and works out where in the LWA the character should be displayed. It calls frcrdrw, and then moves the caret one position along. The frcrdrw (force redraw) routine is called with:

```
SYS frcrdrw,handle,x1
,y1,x2,y2
```

where x1, y1, x2, y2 are the co-ordinates, relative to the LWA origin, of the rectangle which needs to be redrawn. The next call to poll will result in a redraw window request event if any part of that rectangle is visible on the screen.

The other routine for handling the caret is getcaret. Although it's not actually used in listing 3, it can be called with:

```
SYS getcaret,0,block
```

On return, the parameter block contains the information which was passed in the last setcaret call, so in theory your program does not even need to keep track of where the caret is on the screen!

Icons and menus

We've mentioned both icons and menus in passing, but haven't said much about them. A future article will cover these aspects of the WIMP environment, but for now you have got enough information and examples to program your own scrollable windows. Experiment with the existing programs by increasing the number of windows or putting different things in them. Try altering listing 3 so that the caret is positioned wherever you click the mouse. There are all sorts of possibilities which scrolling windows make available – consider what benefits would a really large logical work area give you, for instance.

Start thinking now about how you could alter your own programs to take advantage of scolling windows. Several of *Acorn User*'s own listings could be radically improved by a combination of windows and mouse control.

Over the coming month's we'll take a look at how to write Arc menus and use the mouse in your programming.

The listings from this article are on the yellow pages, see page 113. They are also available on Arc-format discs – see page 13.

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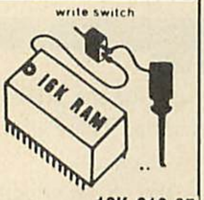
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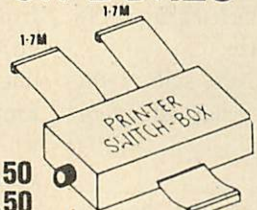
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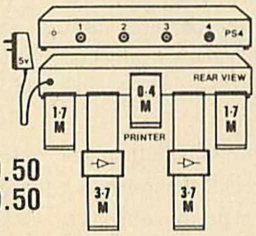
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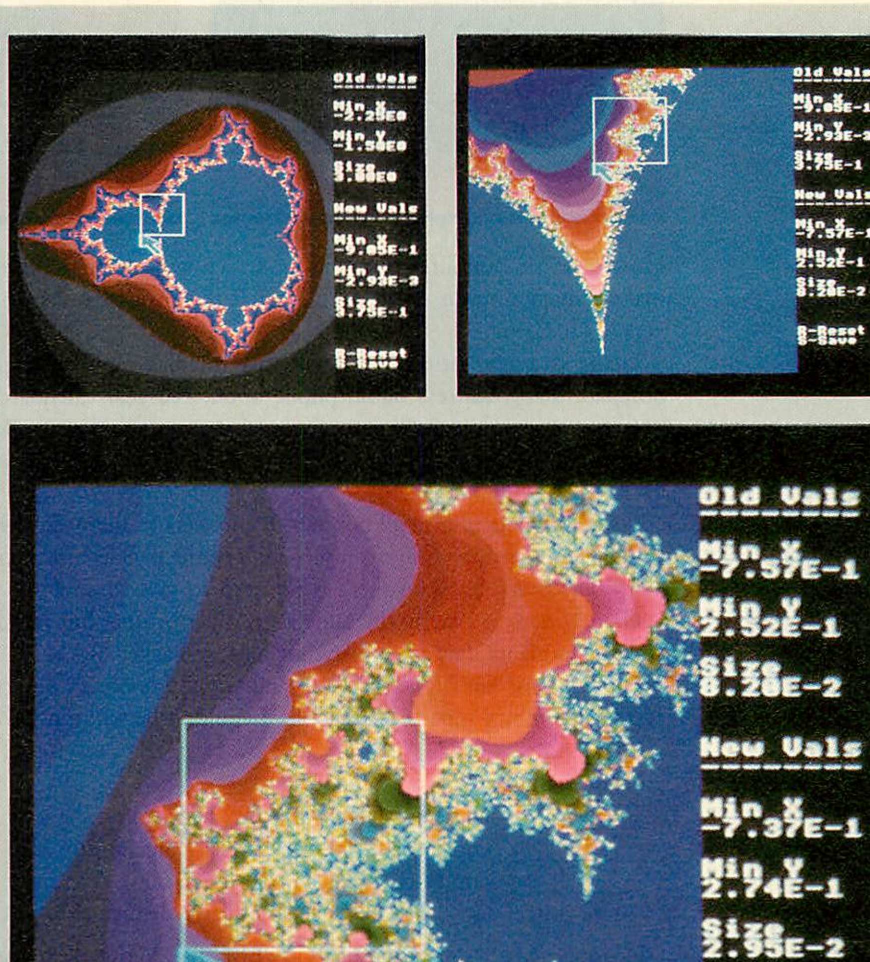
Andrew Fedonczuk

The Mandelbrot set has a fascination which makes people use up hundreds of hours of computer time exploring it. *Acorn User* first introduced the subject of the Mandelbrot and Julia sets in an article by Susan Stepney in October 1983. The Archimedes micros run all the programs presented in earlier articles about fractals and the Mandelbrot set, but to make the most of the Arc's power, a new program is required. Because of its processing speed, the Archimedes can calculate 65,000 pixels of the Mandelbrot set in under 30 seconds using listing 1 in the yellow pages. Compare this with the typical times for other machines on page 105.

The Arc calculates a picture of the whole set in a medium resolution, equivalent to mode 1 but with 256 colours, and then allows you to 'zoom' into the set, using the mouse. The right and left buttons expand and shrink a box around the area to be selected, and the middle button starts the re-plotting of the area. Pressing the 'R' key returns you to the first screen showing the whole set and pressing the 'S' key saves the current screen onto your disc.

The procedure which performs the calculations is written in ARM machine code, but the rest is written in Basic 5 and demonstrates some of the language's new features. There isn't space to describe the program in detail, but I can explain why it runs so fast. The May 1986 issue of *Acorn User* explains the mathematics behind the Mandelbrot set.

The secret of the Archimedes' speed lies in its RISC architecture. It is based on a 32-bit Reduced Instruction Set Computer, known as the 'Acorn RISC Machine', or ARM. The architecture of the ARM was described in detail by Peter Cockerell in June 1987's *Acorn User*. The ARM chip



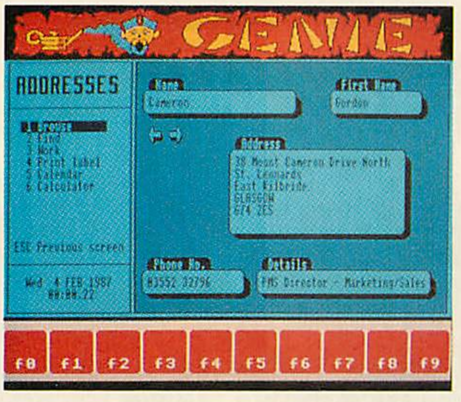
Using the mouse to control the square, successive enlargements show greater and greater detail of the fractal patterns. The complete Mandelbrot set is shown top left

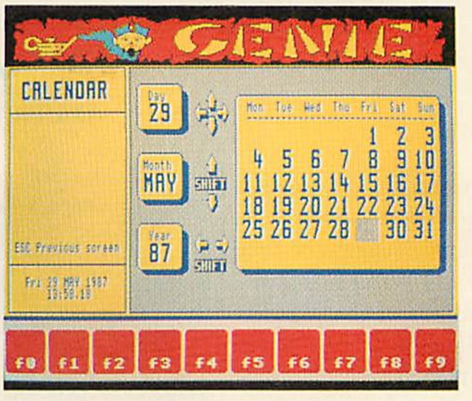
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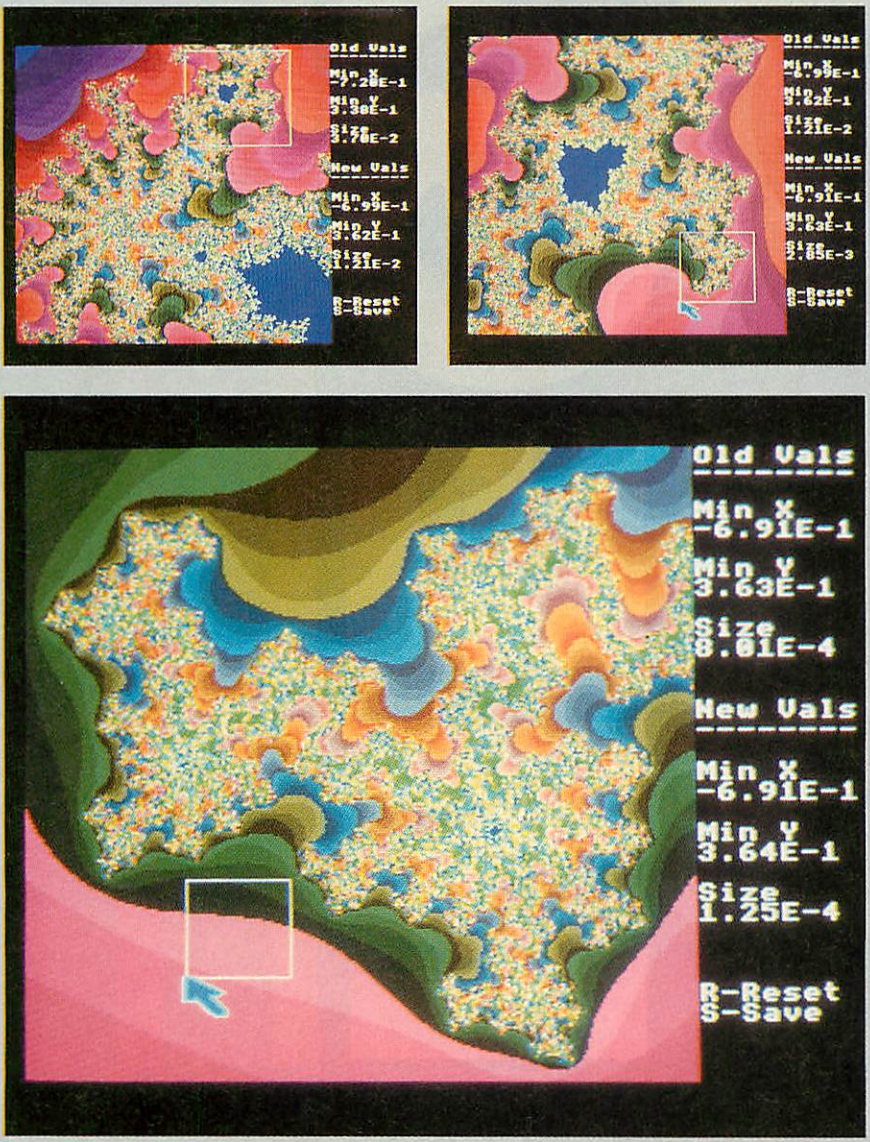
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MANDELBROT SPEEDS

Computer	Language	Time for 65,000 pixels
BBC model B	Basic	8.5 hours
BBC Master Turbo	Basic	3 hours
IBM PC	Turbo Pascal	1.5 hours
Atari ST	68000 assembler	4 minutes
32 BBCs processing in parallel on an Econet system	6502 assembler	3 minutes
MicroVax	C	2.5 minutes
Single Archimedes without co-processor	ARM assembler	28 seconds



As the zoom continues deeper and deeper into the pattern, there is always more detail to discover. This infinite complexity is the unique property of fractal graphics

has been optimised to execute a small set of instructions very quickly. It can execute up to eight million of these instructions per second, but the average speed to closer to four million per second. This reduction is caused by a delay while the chip waits for data from slower memory chips. There is also a technique called pipelining. While the processor is executing an instruction, it is working on the next two instructions too. But when the program branches, the pipeline has to be 'flushed' and the work done on the next two instructions is wasted. This makes the processor wait for the pipeline to be refilled and slows down the execution speed.

To speed up ARM programs as much as possible, short branches which just skip a few instructions can be avoided. All the instructions in ARM machine code can be made conditional. An instruction such as add with carry (ADC) can be made to happen only when, say, the overflow flag is clear, by adding two letters to ADC to specify the condition – in this case the instruction becomes ADCVC.

Another feature of the ARM is a device called the 'barrel shifter'. This can shift or rotate any register left or right by any amount, having the effect of multiplying or dividing by any power of two. This can be combined with the other instructions without slowing down the program, and some quite complex instructions can be built up. For example the instruction 'ADD R0, R1, R2, LSR R3' shifts register 2 to the right by a number of places specified by register 3, adds it to register 1 and stores the result in register 0, all in one clock cycle.

Machine code calculations

The pictures of the Mandelbrot set are generated by repeatedly performing a set of calculations. The answer from the first calculation is fed back into the second calculation again and again, until the answer either exceeds a certain limit or the machine gives up after 128 successive calculations. This is done for each point on the screen, and the colour is assigned by counting the number of repetitions required to reach the limit. The points where the limit is never reached make up the Mandelbrot set itself, and the 'contours' of different colours around the set are just successively better approximations to the set.

Writing a program to produce the Mandelbrot set in a language such as Basic is fairly easy – Basic takes care of the floating point number calculations. Writing similar floating point routines in machine code is

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difficult. But the bits of a binary number don't have to represent the integer values 1, 2, 4, 8. They could just as easily represent fractions such as 1/2, 1/4, 1/8 and so on. This is how the program performs its calculations using integer add, subtract and multiply instructions. These calculations involve several multiplies, so it's the speed of the multiply routine which determines the overall calculation time.

Current Archimedes micros are built using a modified version of the ARM chip described in *Acorn User* June 1987. The two micron ARM, as it is known, has an extra instructions built into its hardware. It can multiply two 32-bit numbers in around two microseconds. A machine code routine for the 6502 chip in the BBC model B would take about 30 microseconds just to multiply two eight-bit numbers. It is the ARM multiply instruction that the program uses. However the result is truncated to 32 bits, and we need to perform a 'long multiply' with several such hardware multiplies to get the full, 64-bit, result.

An alternative is to shift the numbers before and after the multiply, so that only one multiply instruction is needed. This is twice as fast, but less accurate. The program uses this fast but approximate method for the first few pictures, and then switches to the more accurate method as you zoom deeper into the set. Ultimately, both methods become too inaccurate. This limits the number of zooms to around eight over most of the set before the picture cracks up.

Screen handling

The program doesn't use standard PLOT routines to display the picture on the screen. For speed it accesses the screen memory directly. In a 256-colour mode on an Archimedes this is easy, because each byte of memory corresponds directly to a pixel on the screen. A problem arises because the Archimedes' use of memory changes according to the machine's current configuration. This is why there isn't a memory map in the User Guide. But Acorn have designed the Arthur operating system well. There is a routine to read the VDU variables, including the start address of the screen memory. Calling operating system routines from Basic 5 is now easier – just use a SYS command specifying the name of the routine, any numbers to be passed into registers and any variables to be read back from registers.

Many of the most useful Arthur operating system calls have been implemented as Basic keywords. For example, 'MOUSE x, y, b' reads the mouse position and button status to variables x, y and b, 'WAIT' waits for a screen refresh to allow flicker free animation like *FX 19, and 'OFF' switches off the cursor.

VARIABLES

resX, resY Current screen resolution
sizX, sizY The area of the screen to be filled (in pixels)
limit Maximum number of iterations. If this is small then the calculations will be very fast but with poor resolution. For serious exploration change the value of limit to 256.
minX, minY Co-ordinates of square in which the Mandelbrot set is to be plotted.
size Distance across area to be plotted.

JARGON BOX

Fractal A fractal is a pattern which remains as full of detail no matter how much you enlarge it. Most shapes become simpler as you zoom in on a part of them; a tiny part of a circle looks like a straight line. But closer examination of a small part of a fractal simply reveals more intricacies. A common example of a fractal is the coastline – whether you are looking at a atlas map of Africa or a 1:250,000 map of Skegness the amount of 'crinklyness' remains the same. Even if you zoom in as close as the outline of a rock pool the pattern is just as complex. Fractals are common in nature, and much scientific work is being done on their mathematics to attempt to understand 'random' shapes such as clouds and mountain ranges.
Mandelbrot set A fractal pattern. The co-ordinates of a point on the screen are fed into a mathematic equation, and then the results are repeatedly put back into the same equation. The number of times the process has to be repeated before a certain target is reached is used to choose the colour of that point on the screen, eg if the it takes six runs through the equation to reach the target the point is coloured, say, blue, seven and the point is green, eight yellow and so on. The mathematics of the Mandelbrot set, so named after its French discoverer, Benoit Mandelbrot, were covered in an article by David Johnson-Davies in May 1986's *Acorn User*, and more examples were given in May 1987's issue.
Julia set A fractal pattern based on a different mathematical equation to the Mandelbrot set, covered in October 1983's *Acorn User*.

Procedures and functions

PROCselmode checks there's enough configured screen and sprite memory, reads the address of the start of screen memory, and selects the primary bank of mode 13. This allows direct access to the screen memory. Then PROCinit sets up the screen window and turns off the cursor.

PROCbasemand generates a picture of the whole set (X from −2.25 to +0.75, Y from −1.5 to +1.5) and saves it as a sprite. This sprite is used by PROCreturn, when you return to the picture of the whole set. This allows you to zoom somewhere else faster. FNzoom uses the mouse to select an area of the current screen to expand to full screen size. It adjusts the values of minX, minY and size. The function returns a TRUE value to zoom onwards, FALSE to go back to the first screen. Once a new area is selected, PROCmandelbrot calculates the new area of the set, using the current values of minX, minY and size.

The ARM assembly language is contained in two routines. PROCassem assembles a routine to calculate the set using either the fast or slow multiply routine. And FNmulti is a multiply macro used by PROCassem – it assembles either the fast or slow multiply routine, as needed.

Animation

Interesting screens from the Mandelbrot set can be stored using the 'S' key after the picture has been drawn. This uses the *SCREENSAVE command, and means that the screens use the standard sprite format. So they can be loaded as sprites and animated too.

Try calculating many small sets, store them as sprites and then animate them for a real 'zoom'. Have fun exploring using this program – you won't have to leave your BBC running overnight to see some results.

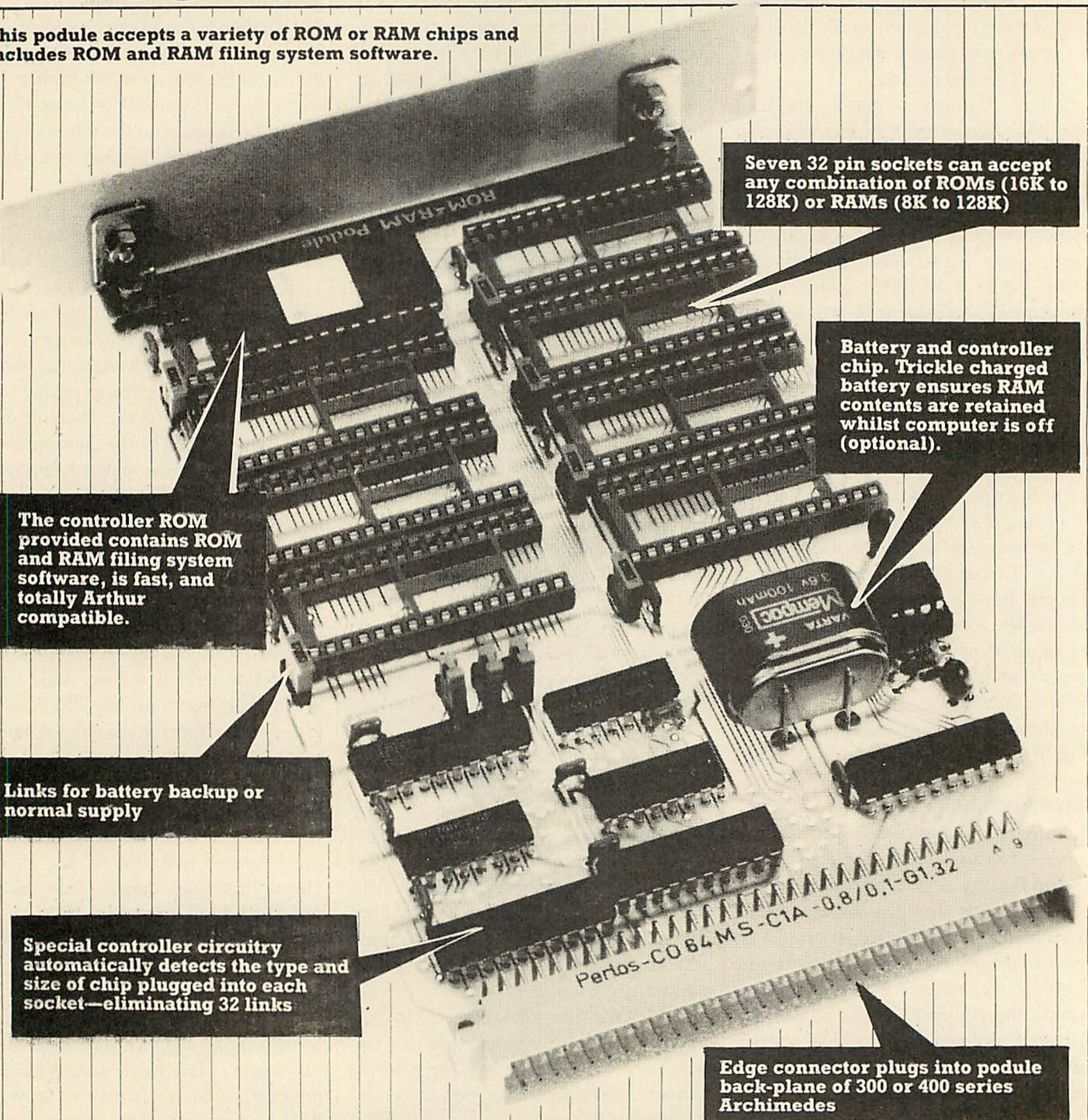
I am sure that someone will be able to knock a few more seconds off the calculation time using an unexpanded Archimedes. Also, by using the planned arithmetic co-processor on a 400-series Arc, it should be possible to reduce the calculation time for a whole screen to around five seconds!

The Archimedes Mandelbrot listing is on the yellow pages; see the index on page 113. The program is also available on Arc-format 3.5-inch disc, see page 13 for details.

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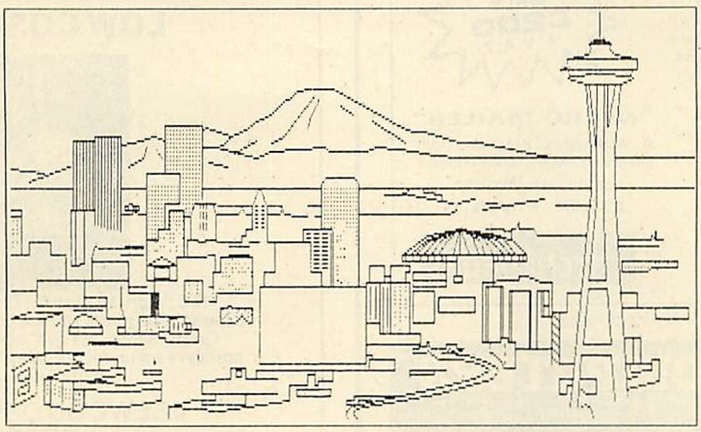
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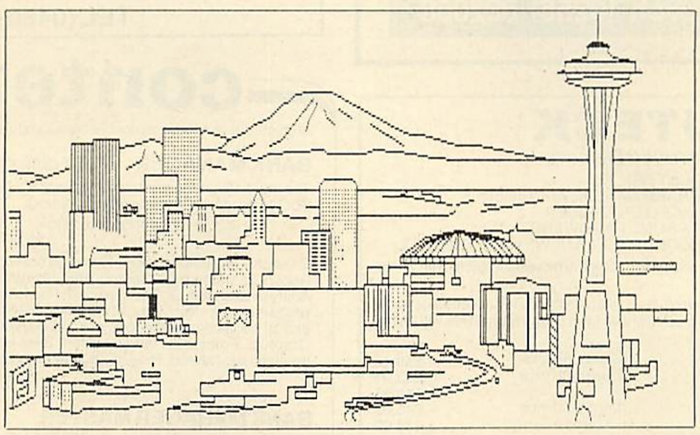
COMPETITION

SPOT THE DIFFERENCE

Find the changes in these two pictures and a package of *Acorn User* graphics software could be yours

Tony Quinn





Graphics is the theme of this month's prize competition. Up for grabs are three products from *Acorn User*'s own software range which can help you draw pictures, give you inspiration and then print them out in the easiest possible way.

The three winners will each get: a *Graphics Utilities* disc; the *Portfolio* disc by Jonathan Inglis, and the *UserDump* ROM by George Hill – a software bundle worth almost £40. Details of these packages can be found on pages 129-134.

This is what you do. There are some subtle differences between the two pictures above and you have to spot them. We're not saying how many changes there are, so ring them on the top picture, cut this out, stick it on a card and send it to us by Friday, March 18. State on the card how many changes you've found, along with your own name and address. You can photocopy the picture to save cutting up the issue, but you must attach the small coupon below.

The picture is called 'Zenith' by an unknown artist (we'd like to hear from him or her). It was done in mode 0 on a BBC micro, and the results printed out on a Taxan printer using one of this month's prizes – the *Acorn User UserDump* ROM.

Entries should be send to: March Competition, *Acorn User*, Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ.

Next month's contest

Here's some advance warning for next month's competition. *Acorn User* is getting together with the British Trust for Conservation Volunteers to encourage replanting of trees. The competition will aim to get readers interested in restoring many of the damaged woodlands in Britain, and raise money for the Trust. The BTCV is a charitable organisation whose patron is the Duke of Edinburgh.

And there will be a special part of the competition for Micronet users with their own prizes, and a Chatline with members of the Trust.

Free copies of the BTCV's *Emergency Tree Pack* are available from *Acorn User*, and a second pack of 10 booklets called *Conservation in School Grounds* costs £2.95 inclusive (cheques payable to BTCV please). So don't miss out on the next issue: get your newsagent order in now.

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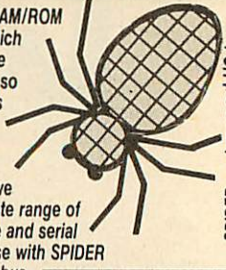
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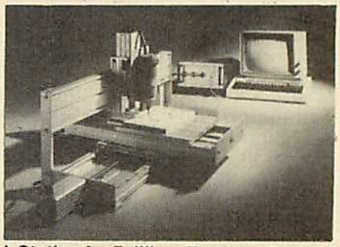
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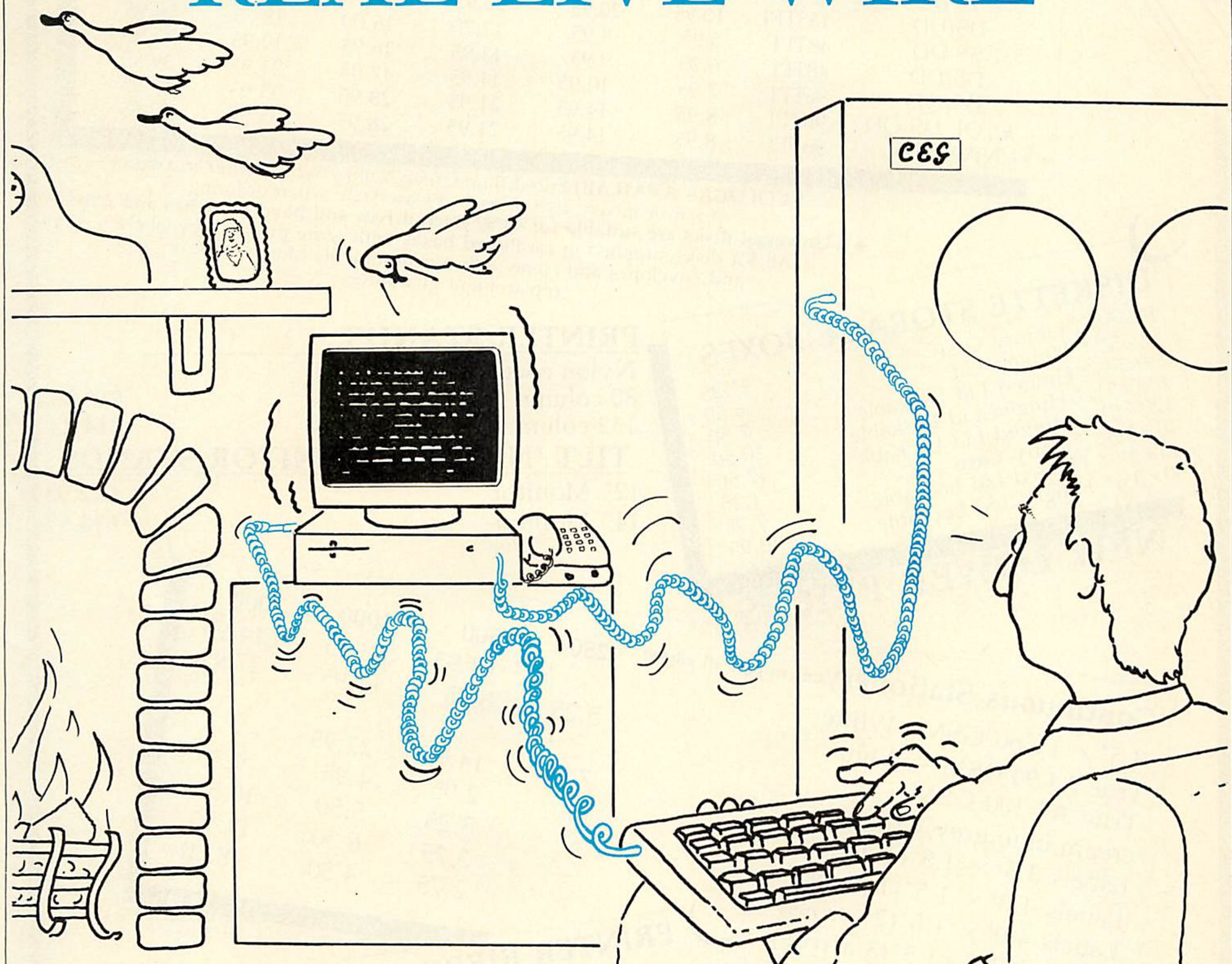
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YELLOW PAGES

INDEX/COMPATIBILITY

Entering listings

To make the task of entering listings easier, *Acorn User* has adopted several standards in the yellow pages. Programs are listed with line numbers in increments of 10, so type AUTO <Return> for automatic line numbering before you start. Before you list what you've entered, type LISTO 1 <Return> to provide spaces after the line numbers. Programs in the yellow pages are often listed to a width of 40 characters, so type MODE 6 <Return> before you start. Comparing the line-endings of your listing with the yellow pages will help you spot extra or missing characters.

To make sure that the program you want to enter will work on your particular machine, check the index below. All the listings work with Basic 1, 2 and 4 (unless stated otherwise) and with operating systems OS1.2 or above. If a program is accompanied by an article, please read the article first. If special care is needed when entering, we provide an easy-to-complete 'How To Enter' box.

Once you've typed in your program, save it to tape or disc then test it by running it. If you have a major problem with a listing, ask someone to check it. If you still have difficulties, you can also send off for a list of *Checksums* which help you find the errors. Send a large sae (26p stamp) to *AU*Checksums, PO Box 641, London NW9 8TF.

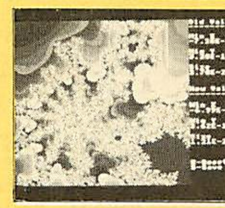
BUILD YOUR OWN TOOLKIT ROM

119
Store your most frequently used utilities in sideways RAM



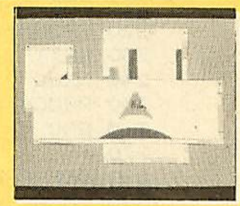
MANDELBROTS IN MOMENTS

122
High-speed Archimedes graphics with this fascinating program



ARC WINDOWS WITHOUT PAIN

124
First steps in WIMP programming on the Archimedes

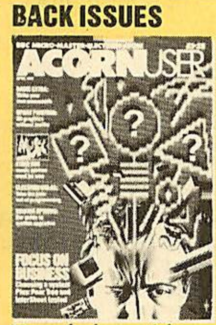


DISCS AND TAPES



All the listings on these pages can be found on this month's listings disc or cassette. See page 129 for details of how to order.

BACK ISSUES





For help with entering and debugging listings see the following back issues: April '86, June '85, Aug '84, Sept '83.

Program	Page	BBC B	B+/128	Master 128	Master Compact	Electron	Arc	6502SP/ Turbo	ADFS	Econet	Shadow RAM	Monthly T/D
Hints & Tips	114											
Listing 1		■	■	■	■	■	■	■	■	■	■	■
Listing 2[1]		■	■	■	■	■		■	■	■	■	■
Acorn Forum	115											
Listing 1							■		■	■		■
Listings 2-3[2]		■	■	■	■	■		■	■	■	■	■
Listings 4		■	■	■				■	■	■	■	■
Joe's Jottings	117											
Listings1-4[3]		■	■	■				■	■	■	■	■
Build Your Own ROM	119											
Listings 1-3[4]		■	■	■	■	■		■	■	■	■	■
Mandlebrots in Moments	122											
Listing 1							■		■	■		■
Arc Windows	124											
Listings 1-3							■		■	■		■

Notes: [1] Requires *Wordwise Plus*, [2] Listing 3 requires ADFS, [3] Requires MCL ROM, [4] Requires sideways RAM.

YELLOW PAGES

HINTS & TIPS

See Hints & Tips, page 39

Listing 1. Tower of Hanoi

```
10 REM Hints & Tips listing 1
20 REM By Martin Phillips
30 REM For BBC B/B+/M/C/E/A/Nimbus wi
th BBCbasic(86)
40 REM (c) Acorn User March 1987
50 :
60 MODE 1
70 VDU 23,1,0;0;0;0;
80 DIM A% 2000
90 N%=0:D=A%+4
100 !D=&1020300
110 INPUT "Number of discs "F
120 ?A%=0
130 A%?1=F
140 A%?2=0
150 A%?3=0
160 ?D=F
170 PRINT TAB(0,1) "    It should take
";2^F-1;" moves"
180 size%=100/F
190 Y%=size%*8
200 IF Y%>64 THEN Y%=64
210 FOR Q=0 TO F-1
220 PROCdraw(1,Q,Q,1)
230 NEXT Q
240 N%=0
250 PROCproc
260 END
270 :
280 DEF PROCproc
290 LOCAL t
300 IF ?D=0 THEN ENDPROC
310 D?4=?D-1
320 D?5=D?2
330 D?6=D?1
340 D?7=D?3
350 D=D+4
360 PROCproc
370 pi=D?-3
380 t=D?-1
390 PROCdraw(t,(F-?D)-1,(A%?t)-1,0)
400 PROCdraw(pi,F-?D,(A%?pi),1)
410 A%?t=A%?t-1
420 A%?pi=A%?pi+1
430 D?3=D?-2
440 D?2=t
450 D?1=pi
460 PROCproc
470 D=D-4
480 ENDPROC
490 :
500 DEF PROCdraw(pile,n,height,col)
510 IF col=1 THEN N%=N%+1:PRINT TAB(10
,2)N%;" moves"
520 pile=pile-1
530 X%=pile*420+80+size%*n
540 x%=400+pile*420-size%*n
550 GCOL 0,(n MOD 3)+129
560 IF col=0 THEN GCOL0,128
570 VDU 24,X%;Y%*height;x%;Y%*(height+
1)-4;16,26
580 GCOL 0,3
590 ENDPROC
```

Listing 2. *Wordwise Plus* string search

```
REM String Search Program
REM by Mike Roden
REM for B/B+/M/C/E with Wordwise Plus
REM (c) Acorn User March 1988

*FX 229,1
VDU 28,0,4,39,1
CLS
PRINT " Search for? ";
A$=GLK$
CURSOR TOP
PROCmarker
VDU 26

.go
FIND A$
IF EOT THEN GOTO nosign
C%=?&07E
DISPLAY
VDU 31,1,0
PRINT "          -   ";
PRINT "Is this it? (Y/N) -      ";
VDU 31,C%,13
G%=GET
DISPLAY
IF G%=89 OR G%=121 THEN GOTO display
CURSOR RIGHT 1
GOTO go
END

.display
*FX 229,0
DOTHIS
FKEY0
TIMES 2
DISPLAY
END

.nosign
DISPLAY
VDU 7
VDU 31,1,0
PRINT " - Search completed.";
PRINT " Press any key -";
G%=GET
DISPLAY
CURSOR TOP
GOTO display
END

.marker
FIND MARKERS
IF EOT THEN GOTO nomarkers
PRINT " From marker only? (Y/N)":
G%=GET
IF G%=89 OR G%=121 THEN ENDPROC

.nomarkers
CURSOR TOP
ENDPROC
```

March listings

The easiest way to enter the listings is to buy the monthly listings disc or cassette. It saves time and avoids errors, especially with a long program. The disc is fully menu-driven and an excellent buy at only £5.95. The cassette version for the BBC micro and Electron contains a tape to disc transfer program and costs £3.95. The programs are also available on 3.5-inch disc for the Arc, Compact and Electron at £7.95, see page 13 for details of how to order.

The listings can also be downloaded from Micronet if you have a Micronet subscription (page 600 600 890A). The Acorn User *software can be downloaded just like any other programs from Prestel. Go to the first page by entering *600600890#. From there the operation is fully prompted. The charge for the software from Micronet is £5.00, so you can save money too.*

YELLOW PAGES

ACORN FORUM

See Acorn Forum, page 49

Listing 1. Archimedes disassembler

```
   10 REM > ARMdis
   20 REM by Peter Sandford
   30 REM for Archimedes only
   40 REM (c) Acorn User March 1988
   50 :
   60 ON ERROR OSCLI ("FX 4"):END
   70 *FX4,1
   80 INPUT "Start address : ",address$
   90 address%=4*(EVAL("&"+address$) DIV
 4)
  100 back%=FALSE
  110 step%=4
  120 mem%=FALSE
  130 REPEAT
  140 IF back% THEN PRINT STRING$(8,"<")
  150 IF mem% THEN
  160 step%=&100
  170 OSCLI ("memory "+STR$~address%+" +
"+STR$~step%)
  180 ELSE
  190 step%=4
  200 OSCLI ("memoryI "+STR$~address%+"
+"+STR$~step%)
  210 ENDIF
  220 CASE GET OF
  230 WHEN 9:mem%=NOT mem%:PRINT STRING$
(8,"=")
  240 WHEN 139:address%-=step%:back%=TRU
E
  250 OTHERWISE:address%+=step%:back%=FA
LSE
  260 ENDCASE
  270 UNTIL FALSE
  280 END
```

Listing 2. Program overwrite warner

```
   10 REM Overwrite warn
ing
   20 REM by Dave Athert
on
   30 REM for B/B+/E/M/C
   40 REM (c) Acorn User
 March 1988
   50 :
   60 M%=&900
   70 osfile=&FFDD
   80 osrdch=&FFE0
   90 oswrch=&FFEE
  100 osnewl=&FFE7
  110 osbyte=&FFF4
  120 filev=&212
  130 ind1v=&230
  140 zp=&90
  150 FOR pass=0 TO 3 ST
EP 3
  160 P%=M%
  170 [OPT pass
  180 LDA filev+1
  190 CMP #patch DIV 256
  200 BNE install
  210 BRK
  220 OPT FNequb(255)
  230 OPT FNequs("WARN a
lready installed")
  240 OPT FNequb(0)
  250 :
  260 .install
  270 SEI
  280 LDA filev
  290 STA ind1v
  300 LDA filev+1
  310 STA ind1v+1
  320 LDA #patch MOD 256
  330 STA filev
  340 LDA #patch DIV 256
  350 STA filev+1
  360 CLI
  370 RTS
  380 :
  390 .patch
  400 PHP
  410 STA zp
  420 STX zp+1
  430 STY zp+2
  440 CMP #0
  450 BNE out2
  460 JSR anyfile
  470 CMP #0
  480 BEQ out
  490 LDY #0
  500 .tloop
  510 LDA text,Y
  520 BEQ tex
  530 JSR oswrch
  540 INY
  550 BNE tloop
  560 .tex
  570 LDA #21
  580 LDX #0
  590 JSR osbyte
  600 JSR osrdch
  610 AND #&DF
  620 CMP #ASC "Y"
  630 BEQ yes
  640 LDA #ASC "N"
  650 JSR oswrch
  660 JSR osnewl
  670 JSR unstack
  680 PLP
  690 RTS
  700 .yes
  710 JSR oswrch
  720 JSR osnewl
  730 .out
  740 JSR unstack
  750 .out2
  760 PLP
  770 JMP (ind1v)
  780 :
  790 .unstack
  800 LDA zp
  810 LDX zp+1
  820 LDY zp+2
  830 RTS
  840 :
  850 .anyfile
  860 LDY #1
  870 .aloop
  880 LDA (zp+1),Y
  890 STA buffer,Y
  900 DEY
  910 BPL aloop
  920 LDA #5
  930 LDX #buffer MOD 25
6
  940 LDY #buffer DIV 25
6
  950 JMP (ind1v)
  960 :
  970 .text
  980 OPT FNequs("Are yo
u sure (Y/N)")
  990 OPT FNequb(0)
 1000 .buffer
 1010 OPT FNequd(0)
 1020 OPT FNequd(0)
 1030 OPT FNequd(0)
 1040 OPT FNequd(0)
 1050 OPT FNequw(0)
 1060 .end
 1070 ]
 1080 NEXT
 1090 A$="SAVE WARN  "+S
TR$~M%+"+"+STR$~(end-M%)
 1100 PRINT A$
 1110 PRINT "Press any k
ey to save the code"
 1120 IF GET
 1130 PROCoscli(A$)
 1140 *WARN
 1150 PRINT "Code instal
led"
 1160 END
 1170 :
 1180 DEF FNequb(b%)
 1190 ?P%=b%
 1200 P%=P%+1
 1210 =pass
 1220 :
 1230 DEF FNequw(b%)
 1240 ?P%=b% MOD 256
 1250 P%?1=b% DIV 256
 1260 P%=P%+2
 1270 =pass
 1280 :
 1290 DEF FNequd(b%)
 1300 !P%=b%
 1310 P%=P%+4
 1320 =pass
 1330 :
 1340 DEF FNequs(b$)
 1350 $P%=b$
 1360 P%=P%+LEN(b$)
 1370 =pass
 1380 :
 1390 DEF PROCoscli(stri
ng$)
```

Continued ►

◀ Acorn Forum listing 2 continued

```
1400 DIM X% &FF
1410 Y%=X% DIV 256
1420 $X%=string$
1430 CALL &FFF7
1440 ENDPROC
```

Listing 3. *DRIVE for ADFS

```
   10 REM *DRIVE for ADF
S
   20 REM by Martin Hesk
eth
   30 REM for B/B+/E/M/C
 with ADFS
   40 REM (c) Acorn User
 March 1988
   50 :
   60 oscli=!&208 AND &F
FFF
   70 DIM dir$(3)
   80 DIM block(3)
   90 addr=&A90
  100 :
  110 PRINT '"*DRIVE Int
ercept Program"
  120 PRINT ''"Enter the
 directory selected when
:"'
  130 FOR drive=0 TO 3
  140 PRINT "A *DRIVE ";
drive;" command is given
: $.";
  150 INPUT TAB(31)dir$(
drive)
  160 $(addr)="dir $."+d
ir$(drive)
  170 block(drive)=addr
  180 addr=addr+LEN("###
####"+dir$(drive))
  190 NEXT drive
  200 :
  210 PROCassemble
  220 file$="DRV"
  230 A$="SAVE "+file$+"
 "+STR$~(cmd)+" "+STR$~(
addr)+" "+STR$~(init)
  240 PRINT A$
  250 PRINT "Press a key
 to save the code"
  260 IF GET
  270 PROCoscli(A$)
  280 PRINT "Type *";fil
e$;" to initialise the *
DRIVE feature"
  290 END
  300 :
  310 DEF PROCassemble
  320 FOR pass=0 TO 2 ST
EP 2
  330 P%=&9C0
  340 [OPT pass
  350 .cmd
  360 PHA
  370 PHX
  380 PHY
  390 INX
  400 STX &70
  410 STY &71
  420 LDA #drive MOD 256
  430 STA &72
  440 LDA #drive DIV 256
```

Continued ▶

◀ Acorn Forum listing 3 continued

```
  450 STA &73
  460 LDY #0
  470 .loop
  480 LDA (&72),Y
  490 STA store
  500 LDA (&70),Y
  510 INY
  520 CMP store
  530 BNE nrec
  540 TYA
  550 CMP #5
  560 BNE loop
  570 .com
  580 JSR sdir
  590 .ret
  600 PLY
  610 PLX
  620 PLA
  630 RTS
  640 .store OPT FNequb(
&00)
  650 .drive OPT FNequs(
"DRIVE")
  660 .nrec
  670 CMP #ASC"."
  680 BEQ poss
  690 .exe
  700 PLY
  710 PLX
  720 PLA
  730 JSR oscli
  740 RTS
  750 .poss
  760 TYA
  770 CMP #3
  780 BPL com
  790 CMP #2
  800 BEQ disc
  810 JMP exe
  820 .disc
  830 LDA #143
  840 LDX #18
  850 LDY #4
  860 JSR &FFF4
  870 JMP ret
  880 .sdir
  890 LDA (&70),Y
  900 CMP #32
  910 BEQ space
  920 CMP #48
  930 BEQ dir0
  940 CMP #49
  950 BEQ dir1
  960 CMP #50
  970 BEQ dir2
  980 CMP #51
  990 BEQ dir3
 1000 BRK
 1010 OPT FNequb(205)
 1020 OPT FNequs("Bad dr
ive")
 1030 OPT FNequb(0)
 1040 .space
 1050 INY
 1060 JMP sdir
 1070 .dir0
 1080 LDX #block(0) MOD
256
 1090 LDY #block(0) DIV
256
 1100 JMP select
 1110 .dir1
 1120 LDX #block(1) MOD
256
```

Continued ▶

◀ Acorn Forum listing 3 continued

```
 1130 LDY #block(1) DIV
256
 1140 JMP select
 1150 .dir2
 1160 LDX #block(2) MOD
256
 1170 LDY #block(2) DIV
256
 1180 JMP select
 1190 .dir3
 1200 LDX #block(3) MOD
256
 1210 LDY #block(3) DIV
256
 1220 .select
 1230 JMP oscli
 1240 .init
 1250 LDA #cmd MOD 256
 1260 STA &208
 1270 LDA #cmd DIV 256
 1280 STA &209
 1290 RTS
 1300 ]
 1310 NEXT pass
 1320 ENDPROC
 1330 :
 1340 DEF FNequb(b%)
 1350 ?P%=b%
 1360 P%=P%+1
 1370 =pass
 1380 :
 1390 DEF FNequs(b$)
 1400 $P%=b$
 1410 P%=P%+LEN(b$)
 1420 =pass
 1430 :
 1440 DEF PROCoscli(stri
ng$)
 1450 DIM X% &FF
 1460 Y%=X% DIV 256
 1470 $X%=string$
 1480 CALL &FFF7
 1490 ENDPROC
```

Listing 4. Digital joystick converter

```
   10 REM Digital Joysti
ck Interface
   20 REM by Ahmed Qamru
ddin
   30 REM for BBC B/B+/M
   40 REM (c) Acorn User
 March 1988
   45 :
   50 osbyte=?&20B*256+?
&20A
   60 port=&FE60
   70 ddrb=&FE62
   80 M%=&880
   90 PROCassemble
  100 ?ddrb=0
  110 ?&20B=M% DIV 256
  120 ?&20A=M% MOD 256
  130 PRINT "Joystick co
de installed-now run you
r program"
  140 END
  150 :
  160 DEF PROCassemble
  170 FOR pass=0 TO 3 ST
EP 3
  180 P%=M%
```

Continued ▶

JOE'S JOTTINGS

◄ Acorn Forum listing 4 continued

```
190 [OPT pass
200 CMP #128
210 BNE exit
220 CPX #0
230 BMI exit
240 BEQ fire
250 CPX #3
260 BCC joy
270 DEX
280 DEX
290 .joy
300 LDA port
310 DEX
320 BEQ one
330 ASL A
340 ASL A
350 .one
360 LDY #128
370 ASL A
380 BCC hi
390 BPL lo
400 RTS
410 .lo
420 LDY #0
430 RTS
440 .hi
450 LDY #255
460 RTS
470 .exit
480 JMP osbyte
490 .fire
500 JSR osbyte
510 LDA port
520 AND #8
530 BNE no
540 LDX #3
550 RTS
560 .no
570 LDX #0
580 RTS
590 ]
600 NEXT
610 ENDPROC
```

See Joe's Jottings, page 81

Listing 1. MCL benchmarks

```
DEFINE Title
  10 REM MCL Benchmarks
  20 REM by Joe Telford
  30 REM for B/B+/M with MCL ROM
  40 REM (c) Acorn User March 1988

DEFINE BM2
  10 LET red CONTROL PRINTER (7)
  20 LET on=HIGH
  30 LET off=LOW
  40 PRINT "BM2.S ";
  50 TIME=0
  60 LOOP 1000
  70   red=on
  80 ENDLOOP
  90 PRINT TIME;" E"
 100 red=off

DEFINE BM1
  10 PRINT "BM1.S ";
  20 TIME=0
  30 LOOP 1000
  40 ENDLOOP
  50 PRINT TIME;" E"

DEFINE BM3
  10 n=0
  20 PRINT "BM3.S ";
  30 TIME=0
  40 LOOP 1000
  50   n=n+1
  60 ENDLOOP
  70 PRINT TIME;" E"

DEFINE BM5
  10 n=128
  20 PRINT "BM5.S ";
  30 TIME=0
  40 LOOP 1000
  50   n=(n/2)*2+1
  60   c=n
  70 ENDLOOP
  80 PRINT TIME;" E"
  90 c=0

DEFINE BM4
  10 LET c CONTROL PRINTER (0) TO PRINTE
R (7)
  20 n=0
  30 PRINT "BM4.S ";
  40 TIME=0
```

Continued ►

◄ Joe's Jottings listing 1 continued

```
  50 LOOP 1000
  60   n=n+1
  70   c=n
  80 ENDLOOP
  90 PRINT TIME;" E"
 100 c=0

DEFINE BM6
  10 n=0
  20 PRINT "BM6.S ";
  30 TIME=0
  40 LOOP 1000
  50   n=n+1
  60   IF (n/2)*2=n THEN c=n ELSE c=0
  70 ENDLOOP
  80 PRINT TIME;" E"
  90 c=0

DEFINE BM
  10 BM1
  20 BM2
  30 BM3
  40 BM4
  50 BM5
  60 BM6
```

Listing 2. Reaction timer

```
DEFINE Title
  10 REM MCL Simple Reaction Tester
  20 REM by Joe Telford
  30 REM for B/B+/M with MCL ROM
  40 REM (c) Acorn User March 1988

DEFINE REACT
  10 instructions
  20 WAIT RND(500)+200
  30 CLS
  40 TIME=0
  50 *FX 21,0
  60 REPEAT
  70 UNTIL KEY >0
  80 T=TIME
  90 PRINT "Time taken = ";T;" hundredth
s sec."
 100 PRINT:PRINT
```

Continued ►

JOE'S JOTTINGS

◄ **Joe's Jottings listing 2 continued**

```
DEFINE instructions
  10 CLS
  20 PRINT "When the screen clears, pres
s any key."
  30 PRINT
  40 PRINT "The time you take to press t
he key"
  50 PRINT "will be measured as your rea
ction time!"
  55 PRINT:PRINT
  60 PRINT "Press <SPACE> to start!"
  70 REPEAT
  80 UNTIL KEY=55
  90 PRINT:PRINT "Wait........."
```

Listing 3. Advanced reaction timer

```
DEFINE Title
  10 REM MCL Advanced Reaction Tester
  20 REM by Joe Telford
  30 REM for B/B+/M with MCL ROM
  40 REM (c) Acorn User March 1988

DEFINE REACT
  10 instructions
  20 GRAPH
  30 DIM total(2)
  40 person(1)
  50 person(2)
  60 averages

DEFINE instructions
  10 CLS
  20 PRINT "When you hear a beep, press
any key."
  30 PRINT
  40 PRINT "The time between beep and ke
y-press"
  50 PRINT "will be measured as your rea
ction time!"
  60 PRINT:PRINT
  70 PRINT "Press <SPACE> to start!"
  80 REPEAT
  90 UNTIL KEY =55

DEFINE waitbeep
  10 PRINT "LISTEN!....."
  20 WAIT RND(500)+200
  30 BEEP 1
  40 TIME=0
  50 *FX 21,0

DEFINE actions(go,n)
  10 T=TIME
  20 PRINT "Time = ";T;" /100 sec."
  30 PRINT
  40 JOIN n,go*100,T*10
  50 PLOT n,go*100,T*10
  60 total(n)=total(n)+T

DEFINE person(number)
  10 PRINT "Person ";number;". YOUR GO!"
  20 go=0
  30 REPEAT
  40   waitbeep
  50   REPEAT
  60   UNTIL KEY >0
  70   actions(go,number)
  80   go=go+1
  90 UNTIL go>11
```

Continued ►

◄ **Joe's Jottings listing 3 continued**

```
DEFINE averages
  10 PRINT "AVERAGE TIMES in 1/100th sec
"
  20 PRINT
  30 PRINT "PERSON 1: ";total(1)/11
  40 PRINT "PERSON 2: ";total(2)/11
```

Listing 4. Ferris wheel

```
DEFINE Title
  10 REM MCL Ferris Wheel
  20 REM by Joe Telford
  30 REM for B/B+/M with MCL ROM
  40 REM (c) Acorn User March 1988

DEFINE ferris
  10 setup
  20 WHENEVER panic IS pressed DO shutdo
wn
  30 LOOP
  40   loadchairs(6)
  50   spin(10,6)
  60 ENDLOOP

DEFINE setup
  10 REM here we set the bits which
  20 REM control all the sensors and
  30 REM output devices
  40
  50 LET motor CONTROL PRINTER(0) TO PRI
NTER (1)
  60 stop=0
  70 fwd=1
  80 bwd=3
  90
 100 LET ldr READ ADVAL(1)
 110 dark=1000
 120 light=3000
 130
 140 LET coin READ USER (0)
 150 in=LOW
 160
 170 LET panic READ USER(1)
 180 pressed=LOW

DEFINE loadchairs(n)
  10 LOOP n
  20   wait_for_a_coin
  30   move_to_next_chair
  40 ENDLOOP

DEFINE wait_for_a_coin
  10 PRINT "Please enter a coin!"
  20 REPEAT
  30 UNTIL coin IS in

DEFINE move_to_next_chair
  10 REM complexity due to rubber band
  20 REM drive to motor.
  30 REM move until light shines on ldr
  40 WHILE ldr <dark
  50   motor=fwd
  60 ENDWHILE
  70 REM mve till next chair cuts light
  80 WHILE ldr>light
  90   motor=fwd
 100 ENDWHILE
 110 motor=stop
 120 REM check for overshoot
 130 WAIT 50
```

Continued ►

◀ Joe's Jottings listing 4 continued

```
  140 WHILE ldr>light
  150   motor=bwd
  160 ENDWHILE
  170 motor=stop

DEFINE spin(t,n)
  10 REM spin t TIMES past n CHAIRS
  20
  30 motor=fwd
  40 LOOP t*n
  50   REPEAT
  60   UNTIL ldr>light
  70   REPEAT
  80   UNTIL ldr<dark
  90 ENDLOOP
 100
 110 REM brake,halt,& move to next chair
 120
 130 motor=bwd
 140 WAIT 100
 150 motor=stop
 160 WAIT 300
 170 move_to_next_chair

DEFINE shutdown
  10 REM a problem has occurred so
  20 REM shutdown the system!
  30
  40 motor=bwd
  50 WAIT 100
  60 motor=stop
  70 CRASH
```

See Build Your Own Toolkit ROM, page 87

Listing 1. AutoROM source code

```
   10 REM Autorom
   20 REM By David Lawre
nce
   30 REM For BBC B/B+/M
/C/E with SWR
   40 REM (C) Acorn User
 March 1988
   50 :
   60 MODE 7
   70 HIMEM=&6000
   80 PROCvars
   90 PROCass
  100 PROCcheck
  110 $cli="*SAVE Autoro
m 6000 "+STR$~P%+" 8000
8000"
  120 X%=cli MOD 256
  130 Y%=cli DIV 256
  140 CALL oscli
  150 END
  160 :
  170 DEF PROCvars
  180 DIM cli 20
  190 mem=&70:ext=&70
  191 len=&70:from=&72
  192 to=&74:ptr=&F2
  210 err=&100:finfo=&10
0
  211 fname=&112:index=&
8800
  212 store=&8900
  230 oswrch=&FFEE:osnew
l=&FFE7
  240 osasci=&FFE3:osbyt
e=&FFF4
  250 osfile=&FFDD:osarg
s=&FFDA
  260 osfind=&FFCE:oscli
=&FFF7
  270 ENDPROC
  280 :
  290 DEF PROCass
  300 FOR I%=0 TO 2 STEP
 2
  310 P%=&6000:D%=&2000
  320 [OPT I%
  330 .start
  340 RTS
  350 RTS
  360 RTS
  370 JMP service+D%
  380 OPT FNequb(129)
  390 OPT FNequb(copy)
  400 OPT FNequb(1)
  410 .title
  420 OPT FNequs("Autoro
m 1.0")
  430 BRK
  440 .copy
  450 BRK
  460 OPT FNequs("(C) Ac
orn User 1988")
  470 BRK
  480 :
  490 .service
  500 PHP
  510 PHA
  520 CMP #9
  530 BNE not9
  540 JMP help+D%
  550 .not9
  560 CMP #4
  570 BNE not4
  580 JMP starcom+D%
  590 .not4
  600 PLA
  610 PLP
  620 RTS
  630 :
  640 .error
  650 STX mem
  660 STY mem+1
  670 LDY #1
  680 .xerror
  690 LDA (mem),Y
  700 STA err,Y
  710 INY
  720 CMP #0
  730 BNE xerror
  740 LDA #0
  750 STA err
  760 JMP err
  770 :
  780 .mess
  790 STX mem
  800 STY mem+1
  810 LDY #&FF
  820 .pmess
  830 INY
  840 LDA (mem),Y
  850 JSR osasci
  860 BNE pmess
  870 RTS
  880 :
  890 .loadzero
  900 LDX #5
  910 .lzero
  920 LDA zero+D%,X
  930 STA ext,X
  940 DEX
  950 BPL lzero
  960 RTS
  970 .savezero
  980 LDX #5
  990 .szero
 1000 LDA ext,X
 1010 STA zero+D%,X
 1020 DEX
 1030 BPL szero
 1040 RTS
 1050 :
 1060 .hex
 1070 PHA
 1080 LSR A
 1090 LSR A
 1100 LSR A
 1110 LSR A
 1120 JSR dig+D%
 1130 PLA
 1140 AND #&F
 1150 .dig
 1160 CMP #10
 1170 BCC isnum
 1180 CLC
 1190 ADC #7
 1200 .isnum
 1210 ADC #48
 1220 JMP oswrch
 1230 :
 1240 .help
 1250 TXA
 1260 PHA
 1270 TYA
 1280 PHA
 1290 JSR savezero+D%
 1300 LDA (ptr),Y
 1310 CMP #13
 1320 BEQ nonly
 1330 LDX #&FF
 1340 DEY
 1350 .help1
 1360 INX
 1370 INY
 1380 LDA hword+D%,X
 1390 CMP #13
 1400 BEQ bighelp
 1410 LDA (ptr),Y
 1420 CMP #ASC"."
 1430 BEQ bighelp
 1440 AND #&DF
 1450 CMP hword+D%,X
 1460 BEQ help1
 1470 .out
 1480 JSR loadzero+D%
 1490 PLA
 1500 TAY
 1510 PLA
 1520 TAX
 1530 PLA
 1540 PLP
 1550 RTS
 1560 .nonly
 1570 JSR nameonly+D%
 1580 JMP out+D%
 1590 :
 1600 .bighelp
 1610 JSR nameonly+D%
 1620 LDX #(hlptxt+D%) M
OD 256
 1630 LDY #(hlptxt+D%) D
IV 256
 1640 JSR mess+D%
 1650 LDA index
 1660 BEQ nomore
 1670 LDX #(fcached+D%)
MOD 256
 1680 LDY #(fcached+D%)
DIV 256
 1690 JSR mess+D%
 1700 LDX #0
 1710 STX tmp+D%
 1720 .hloop
 1730 LDX tmp+D%
 1740 LDA index,X
 1750 BEQ hdone
 1760 LDY #4
 1770 JSR spcs+D%
 1780 LDY #8
 1790 .names
 1800 LDA index,X
 1810 BNE notend
 1820 LDA #32
 1830 .notend
 1840 JSR oswrch
 1850 INX
 1860 DEY
 1870 BNE names
 1880 LDY #8
 1890 JSR spcs+D%
 1900 LDA tmp+D%
 1910 CLC
 1920 ADC #16
 1930 STA tmp+D%
 1940 BCC hloop
 1950 .hdone
 1960 LDA #&86
 1970 JSR osbyte
 1980 CPX #0
 1990 BEQ nomore
 2000 JSR osnewl
 2010 .nomore
 2020 JMP out+D%
 2030 :
 2040 .nameonly
 2050 JSR osnewl
 2060 LDY #&FF
 2070 .pname
 2080 INY
 2090 LDA title+D%,Y
 2100 JSR oswrch
```

Continued ▶

◀ **Build Your Own ROM Toolkit listing 1 continued**

```
2110 BNE pname
2120 JSR osnewl
2130 RTS
2140 :
2150 .spcs
2160 LDA #32
2170 .spcsl
2180 JSR oswrch
2190 DEY
2200 BNE spcsl
2210 RTS
2220 :
2230 .bmove
2240 LDY #0
2250 .move
2260 LDA len
2270 ORA len+1
2280 BEQ bmoved
2290 LDA (from),Y
2300 STA (to),Y
2310 INC from
2320 BNE notfhi
2330 INC from+1
2340 .notfhi
2350 INC to
2360 BNE notthi
2370 INC to+1
2380 .notthi
2390 DEC len
2400 LDA len
2410 CMP #&FF
2420 BNE move
2430 DEC len+1
2440 LDA len+1
2450 CMP #&FF
2460 BNE move
2470 .bmoved
2480 RTS
2490 :
2500 .starcom
2510 TXA
2520 PHA
2530 TYA
2540 PHA
2550 JSR savezero+D%
2560 LDX #0
2570 STY tmp+D%
2580 .com1
2590 LDA coms+D%,X
2600 CMP #255
2610 BEQ nocom
2620 LDY tmp+D%
2630 .com2
2640 LDA coms+D%,X
2650 BEQ gotcom
2660 LDA (ptr),Y
2670 AND #&DF
2680 CMP coms+D%,X
2690 BNE nextone
2700 INY
2710 INX
2720 BNE com2
2730 .nextone
2740 INX
2750 LDA coms+D%,X
2760 BNE nextone
2770 INX
2780 INX
2790 INX
2800 BNE com1
2810 .gotcom
2820 INX
2830 LDA coms+D%,X
2840 STA mem
2850 LDA coms+1+D%,X
2860 STA mem+1
2870 .movey
2880 LDA (ptr),Y
2890 CMP #13
2900 BEQ ymoved
2910 INY
2920 CMP #32
2930 BEQ movey
2940 DEY
2950 .ymoved
2960 JMP (mem)
2970 :
2980 .nocom
2990 LDX #0
3000 STX ind+D%
3010 .chkind
3020 LDX ind+D%
3030 LDA index,X
3040 BEQ none
3050 LDY tmp+D%
3060 LDA #8
3070 STA count+D%
3080 .cloop
3090 LDA index,X
3100 BEQ gotind
3110 LDA (ptr),Y
3120 AND #&DF
3130 CMP index,X
3140 BNE nextind
3150 INY
3160 INX
3170 DEC count+D%
3180 BNE cloop
3190 .gotind
3200 LDA (ptr),Y
3210 CMP #32
3220 BEQ indok
3230 CMP #13
3240 BEQ indok
3250 .nextind
3260 LDA ind+D%
3270 CLC
3280 ADC #16
3290 STA ind+D%
3300 BCC chkind
3310 .none
3320 JMP out+D%
3330 .indok
3340 LDX ind+D%
3350 LDA index+8,X
3360 STA from
3370 LDA index+9,X
3380 STA from+1
3390 LDA index+10,X
3400 STA to
3410 LDA index+11,X
3420 STA to+1
3430 LDA index+14,X
3440 STA len
3450 LDA index+15,X
3460 STA len+1
3470 JSR bmove+D%
3480 LDA index+12,X
3490 STA jsr+1+D%
3500 LDA index+13,X
3510 STA jsr+2+D%
3520 LDA ptr
3530 STA optr+D%
3540 LDA ptr+1
3550 STA optr+1+D%
3560 LDY #0
3570 .moveptr
3580 INC ptr
3590 BNE notphi
3600 INC ptr+1
3610 .notphi
3620 LDA (ptr),Y
3630 CMP #ASC"*"
3640 BEQ moveptr
3650 CMP #ASC" "
3660 BEQ moveptr
3670 JSR loadzero+D%
3680 PLA
3690 TAY
3700 STY y+D%
3710 PLA
3720 TAX
3730 STX x+D%
3740 PLA
3750 STA a+D%
3760 PLA
3770 STA p+D%
3780 PHA
3790 LDA a+D%
3800 PLP
3810 .jsr
3820 JSR &CAFE
3830 LDA optr+D%
3840 STA ptr
3850 LDA optr+1+D%
3860 STA ptr+1
3870 LDX x+D%
3880 LDY y+D%
3890 LDA p+D%
3900 PHA
3910 LDA #0
3920 PLP
3930 RTS
3940 :
3950 .comout
3960 JSR loadzero+D%
3970 PLA
3980 TAX
3990 PLA
4000 TAX
4010 PLA
4020 LDA #0
4030 PLP
4040 RTS
4050 :
4060 .clear
4070 CMP #13
4080 BNE notclr
4090 LDY #0
4100 TYA
4110 .clrind
4120 STA index,Y
4130 DEY
4140 BNE clrind
4150 LDX #store MOD 256
4160 STX mem
4170 STX index+8
4180 LDX #store DIV 256
4190 STX mem+1
4200 STX index+9
4210 LDA #&C0
4220 SEC
4230 SBC mem+1
4240 STA memfree+1+D%
4250 LDA #0
4260 STA iptr+D%
4270 STA num+D%
4280 STA memfree+D%
4290 JMP comout+D%
4300 .notclr
4310 JMP out+D%
4320 :
4330 .data
4340 CMP #13
4350 BNE notclr
4360 LDA index
4370 BEQ sdone
4380 LDX #(dhead+D%) MO
D 256
4390 LDY #(dhead+D%) DI
V 256
4400 JSR mess+D%
4410 LDX #0
4420 STX tmp+D%
4430 .snames
4440 LDX tmp+D%
4450 LDA index,X
4460 BEQ sdone
4470 LDY #8
4480 .dloop
4490 LDA index,X
4500 BNE nospc
4510 LDA #32
4520 .nospc
4530 JSR oswrch
4540 INX
4550 DEY
4560 BNE dloop
4570 LDA tmp+D%
4580 CLC
4590 ADC #10
4600 PHA
4610 TAY
4620 JSR pdata+D%
4630 INY
4640 INY
4650 JSR pdata+D%
4660 INY
4670 INY
4680 JSR pdata+D%
4690 PLA
4700 TAY
4710 DEY
4720 DEY
4730 JSR pdata+D%
4740 JSR osnewl
4750 LDA tmp+D%
4760 CLC
4770 ADC #16
4780 STA tmp+D%
4790 BCC snames
4800 .sdone
4810 LDA #ASC"&"
4820 JSR oswrch
4830 LDA memfree+1+D%
4840 JSR hex+D%
4850 LDA memfree+D%
4860 JSR hex+D%
4870 LDX #(dfoot+D%) MO
D 256
4880 LDY #(dfoot+D%) DI
V 256
4890 JSR mess+D%
4900 JMP comout+D%
4910 :
4920 .pdata
4930 LDA #32
4940 JSR oswrch
4950 JSR oswrch
4960 LDA index+1,Y
4970 JSR hex+D%
4980 LDA index,Y
4990 JMP hex+D%
5000 :
5010 .cache
5020 CMP #13
5030 BNE docache
5040 LDX #(csyn+D%) MOD
256
5050 LDY #(csyn+D%) DIV
256
5060 JMP error+D%
5070 .docache
5080 LDX #0
5090 .xname
5100 LDA (ptr),Y
5110 STA fname,X
5120 INY
5130 INX
5140 CMP #13
5150 BNE xname
5160 LDX #fname MOD 256
5170 LDY #fname DIV 256
5180 LDA #&40
5190 JSR osfind
5200 CMP #0
5210 BEQ nofile
5220 TAY
5230 LDX #ext
5240 LDA #2
5250 JSR osargs
5260 LDA #0
5270 JSR osfind
5280 LDA num+D%
5290 CMP #16
5300 BEQ noroom
5310 LDA ext+2
5320 ORA ext+3
5330 BNE toobig
5340 LDA ext+1
5350 CMP memfree+1+D%
5360 BCC ok
5370 BNE toobig
5380 LDA ext
5390 CMP memfree+D%
5400 BEQ ok
```

Continued ▶

◀ **Build Your Own ROM Toolkit listing 1 continued**

```
5410 BCC ok
5420 :
5430 .toobig
5440 LDX #(ftb+D%) MOD 256
5450 LDY #(ftb+D%) DIV 256
5460 JMP error+D%
5470 .nofile
5480 LDX #(fnf+D%) MOD 256
5490 LDY #(fnf+D%) DIV 256
5500 JMP error+D%
5510 .noroom
5520 LDX #(nis+D%) MOD 256
5530 LDY #(nis+D%) DIV 256
5540 JMP error+D%
5550 :
5560 .ok
5570 LDY #&11
5580 LDA #&FF
5590 .clrblk
5600 STA finfo,Y
5610 DEY
5620 BNE clrblk
5630 LDA #fname MOD 256
5640 STA finfo
5650 LDA #fname DIV 256
5660 STA finfo+1
5670 LDX #finfo MOD 256
5680 LDY #finfo DIV 256
5690 LDA #&FF
5700 JSR osfile
5710 LDY iptr+D%
5720 LDA finfo+2
5730 STA from
5740 STA index+10,Y
5750 LDA finfo+3
5760 STA from+1
5770 STA index+11,Y
5780 LDA index+8,Y
5790 STA to
5800 LDA index+9,Y
5810 STA to+1
5820 LDA finfo+6
5830 STA index+12,Y
5840 LDA finfo+7
5850 STA index+13,Y
5860 LDA ext
5870 STA index+14,Y
5880 LDA ext+1
5890 STA index+15,Y
5900 LDA memfree+D%
5910 SEC
5920 SBC len
5930 STA memfree+D%
5940 LDA memfree+1+D%
5950 SBC len+1
5960 STA memfree+1+D%
5970 JSR bmove+D%
5980 LDX #0
5990 .fret
6000 INX
6010 LDA fname,X
6020 CMP #32
6030 BEQ ndot
6040 CMP #13
6050 BNE fret
6060 .ndot
6070 DEX
6080 BEQ gotit
6090 LDA fname,X
6100 CMP #ASC"."
6110 BNE ndot
6120 INX
6130 .gotit
6140 LDY #8
6150 STY tmp+D%
6160 LDY iptr+D%
6170 .mname
6180 LDA fname,X
6190 CMP #32
6200 BEQ mndone
6210 CMP #13
6220 BEQ mndone
6230 STA index,Y
6240 INX
6250 INY
6260 DEC tmp+D%
6270 BNE mname
6280 .mndone
6290 LDA num+D%
6300 CMP #15
6310 BEQ noinc
6320 LDA iptr+D%
6330 CLC
6340 ADC #16
6350 STA iptr+D%
6360 TAY
6370 LDA to
6380 STA index+8,Y
6390 LDA to+1
6400 STA index+9,Y
6410 .noinc
6420 INC num+D%
6430 JMP comout+D%
6440 :
6450 .scrap
6460 CMP #13
6470 BNE doscrap
6480 LDX #(ssyn+D%) MOD 256
6490 LDY #(ssyn+D%) DIV 256
6500 JMP error+D%
6510 .doscrap
6520 LDX #0
6530 .scrap1
6540 LDA (ptr),Y
6550 STA fname,X
6560 CMP #13
6570 BEQ eoc
6580 CMP #32
6590 BEQ eoc
6600 INY
6610 INX
6620 CPX #8
6630 BNE scrap1
6640 JMP nofile+D%
6650 .eoc
6660 LDX #0
6670 STX tmp+D%
6680 .fscrap
6690 LDX tmp+D%
6700 LDA index,X
6710 BEQ notthere
6720 LDY #0
6730 LDA #8
6740 STA count+D%
6750 .comploop
6760 LDA index,X
6770 BEQ comped
6780 CMP fname,Y
6790 BNE ncomp
6800 INX
6810 INY
6820 DEC count+D%
6830 BNE comploop
6840 .notthere
6850 JMP nofile+D%
6860 :
6870 .ncomp
6880 LDA tmp+D%
6890 CLC
6900 ADC #16
6910 STA tmp+D%
6920 BCC fscrap
6930 JMP nofile+D%
6940 .comped
6950 LDA fname,Y
6960 CMP #32
6970 BEQ compok
6980 CMP #13
6990 BNE ncomp
7000 :
7010 .compok
7020 LDX tmp+D%
7030 LDA index+14,X
7040 STA len
7050 LDA index+15,X
7060 STA len+1
7070 CPX #&F0
7080 BEQ justdel
7090 LDA index+8,X
7100 STA to
7110 LDA index+9,X
7120 STA to+1
7130 LDA index+24,X
7140 STA from
7150 LDA index+25,X
7160 STA from+1
7170 LDY #0
7180 .shuffle
7190 LDA (from),Y
7200 STA (to),Y
7210 INC to
7220 BNE shuf1
7230 INC to+1
7240 .shuf1
7250 INC from
7260 BNE shuffle
7270 INC from+1
7280 LDA from+1
7290 CMP #&C0
7300 BNE shuffle
7310 LDA tmp+D%
7320 TAX
7330 CLC
7340 ADC #16
7350 TAY
7360 .shufind
7370 LDA index,Y
7380 STA index,X
7390 INX
7400 INY
7410 BNE shufind
7420 LDX tmp+D%
7430 .sublen
7440 LDA index+8,X
7450 SEC
7460 SBC len
7470 STA index+8,X
7480 LDA index+9,X
7490 SBC len+1
7500 STA index+9,X
7510 TXA
7520 CLC
7530 ADC #16
7540 TAX
7550 BCC sublen
7560 LDA num+D%
7570 CMP #16
7580 BEQ justdel
7590 LDA iptr+D%
7600 SEC
7610 SBC #16
7620 STA iptr+D%
7630 .justdel
7640 DEC num+D%
7650 LDA memfree+D%
7660 CLC
7670 ADC len
7680 STA memfree+D%
7690 LDA memfree+1+D%
7700 ADC len+1
7710 STA memfree+1+D%
7720 LDA #0
7730 LDY #&F0
7740 .deloop
7750 CPY #&F8
7760 BNE noiny
7770 INY
7780 INY
7790 .noiny
7800 STA index,Y
7810 INY
7820 BNE deloop
7830 JMP comout+D%
7840 :
7850 .hlptxt
7860 OPT FNequs("   Commands:")
7870 OPT FNequb(13)
7880 OPT FNequs("      *CACHE <file>")
7890 OPT FNequb(13)
7900 OPT FNequs("      *SCRAP <file>")
7910 OPT FNequb(13)
7920 OPT FNequs("      *CLEAR")
7930 OPT FNequb(13)
7940 OPT FNequs("      *DATA")
7950 OPT FNequw(13)
7960 .fcached
7970 OPT FNequs("   Files cached:")
7980 OPT FNequw(13)
7990 .dhead
8000 OPT FNequs("Filename  Load  Exec  Size  Adr")
8010 OPT FNequw(13)
8020 .dfoot
8030 OPT FNequs(" bytes free.")
8040 OPT FNequw(13)
8050 .fnf
8060 BRK
8070 OPT FNequb(255)
8080 OPT FNequs("File not found")
8090 BRK
8100 .ftb
8110 BRK
8120 OPT FNequb(254)
8130 OPT FNequs("File too big")
8140 BRK
8150 .nis
8160 BRK
8170 OPT FNequb(253)
8180 OPT FNequs("No room in index")
8190 BRK
8200 .csyn
8210 BRK
8220 OPT FNequb(252)
8230 OPT FNequs("Syntax: *CACHE <file>")
8240 BRK
8250 .ssyn
8260 BRK
8270 OPT FNequb(251)
8280 OPT FNequs("Syntax: *SCRAP <file>")
8290 BRK
8300 .hword
8310 OPT FNequs("AUTOROM")
8320 OPT FNequb(13)
8330 .coms
8340 OPT FNequs("CACHE")
8350 BRK
8360 OPT FNequw(cache+D%)
8370 OPT FNequs("SCRAP")
8380 BRK
8390 OPT FNequw(scrap+D%)
8400 OPT FNequs("CLEAR")
8410 BRK
8420 OPT FNequw(clear+D%)
8430 OPT FNequs("DATA")
8440 BRK
8450 OPT FNequw(data+D%)
8460 OPT FNequb(255)
8470 .zero
```

Continued ▶

◀ Build Your Own ROMs listing 1 continued

```
 8480 BRK:BRK:BRK:BRK:BR
K:BRK
 8490 .tmp
 8500 BRK
 8510 .memfree
 8520 BRK:BRK
 8530 .iptr
 8540 BRK
 8550 .num
 8560 BRK
 8570 .count
 8580 BRK
 8590 .ind
 8600 BRK
 8610 .a
 8620 BRK
 8630 .x
 8640 BRK
 8650 .y
 8660 BRK
 8670 .p
 8680 BRK
 8690 .optr
 8700 BRK:BRK
 8710 .end
 8720 BRK
 8730 JNEXT
 8740 ENDPROC
 8750 :
 8760 DEF FNequb(b%)
 8770 ?P%=b%:P%=P%+1
 8780 =I%
 8790 :
 8800 DEF FNequw(b%)
 8810 ?P%=b% MOD 256
 8820 P%?1=b% DIV 256
 8830 P%=P%+2
 8840 =I%
 8850 :
 8860 DEF FNequs(b$)
 8870 $P%=b$:P%=P%+LEN(b
$)
 8880 =I%
 8890 :
 8900 DEF PROCcheck
 8910 PRINT "Checking...
"
 8920 PROCsum("start","o
ut",20502)
 8930 PROCsum("out","bmo
ve",16881)
 8940 PROCsum("bmove","g
otind",23862)
 8950 PROCsum("gotind","
data",28313)
 8960 PROCsum("data","to
obig",27149)
 8970 PROCsum("toobig","
scrap",25043)
 8980 PROCsum("scrap","s
hufind",22192)
 8990 PROCsum("shufind",
"hlptxt",12295)
 9000 PROCsum("hlptxt","
end",20917)
 9010 ENDPROC
 9020 :
 9030 DEF PROCsum(S$,E$,
N%)
 9040 T%=0
 9050 FOR I%=EVAL(S$) TO
EVAL(E$)
 9060 T%=T%+?I%:NEXT
 9070 IF T%=N% ENDPROC
 9080 PRINT "Please chec
k from ";S$;" to ";E$;".
"
```

Listing 2. Telephone ring

```
   10 REM PHONE (Autorom
 listing 2)
   20 REM By David Lawre
nce
   30 REM For BBC B/B+/M
/C/E
   40 REM (C) Acorn User
 March 1988
   50 :
   60 mem%=&900
   70 FOR num%=1 TO 9
   80 READ hex$,sum%
   90 tot%=0
  100 REPEAT
  110 val%=EVAL("&"+LEFT
$(hex$,2))
  120 ?mem%=val%
  130 mem%=mem%+1
  140 tot%=tot%+val%
  150 hex$=MID$(hex$,3)
  160 UNTIL hex$=""
  170 IF tot%<>sum% PRIN
T "Error in line ";num%:
END
  180 NEXT num%
  190 *SAVE PHONE 900+60
  200 :
  210 DATA A239A009A9082
0F1FFA905,1267
  220 DATA 8D3809A247A00
9A90720F1,1057
  230 DATA FFA24FA009A90
720F1FFA2,1531
  240 DATA 47A009A90720F
1FFA257A0,1353
  250 DATA 09A90720F1FFC
E3809D0D7,1407
  260 DATA 60000103F60A0
00101007F,485
  270 DATA F6F6FF7F0A010
00100A500,1051
  280 DATA 0900010000000
000060001,17
  290 DATA 000000000023,
35
```

Listing 3. Palindrome checker

```
   10 REM CHECK (Autorom
 listing 3)
   20 REM By David Lawre
nce
   30 REM For BBC B/B+/M
/C/E
   40 REM (C) Acorn User
 March 1988
   50 :
   60 FOR I%=0 TO 2 STEP
 2
   70 P%=&900
   80 [OPT I%
   90 .skipto
  100 INY
  110 LDA (&F2),Y
  120 CMP #13
  130 BEQ eoc
  140 CMP #32
  150 BNE skipto
  160 .skipover
  170 INY
  180 LDA (&F2),Y
  190 CMP #13
  200 BEQ eoc
  210 CMP #32
  220 BEQ skipover
  230 BNE notspc
  240 .eoc
  250 BRK:BRK
  260 EQUS "*CHECK <word
>"
  270 EQUB 13:BRK
  280 .notspc
  290 LDX #0
  300 .move
  310 LDA (&F2),Y
  320 STA word,X
  330 INY:INX
  340 CMP #13
  350 BNE move
  360 LDY #0
  370 DEX
  380 DEX
  390 .compare
  400 LDA word,X
  410 CMP word,Y
  420 BNE notsame
  430 INY
  440 DEX
  450 BNE compare
  460 BRK:BRK
  470 EQUS "Palindrome"
  480 EQUB 13:BRK
  490 .notsame
  500 BRK:BRK
  510 EQUS "Not Palindro
me"
  520 EQUB 13:BRK
  530 RTS
  540 .word
  550 BRK
  560 JNEXT
  570 T%=0
  580 FOR I%=&900 TO P%-
1
  590 T%=T%+?I%:NEXT
  600 IF T%<>11553 PRINT
 "Checksum error":END
  610 *SAVE CHECK 900 97
0
```


See Mandelbrots in Moments, page 103

Listing 1. Archimedes Mandelbrots

```
   10 REM >MANDELBROT
   20 REM by Andrew Fedonczuk
   30 REM for Arc only
   40 REM (C) Acorn User March 1988
   50 :
   60 REM Requires minimum configuration
   70 REM SCREENSIZE=10
   80 REM SPRITESIZE=9
   90 :
  100 MODE 0
  110 DIM code% &1000
  120 PROCselmode
  130 PROCinit
  140 PROCbasemand
  150 REPEAT
  160 WHILE FNzoom
  170 PROCmandelbrot
  180 ENDWHILE
  190 PROCreturn
  200 UNTIL FALSE
  210 END
  220 :
  230 DEF PROCselmode
  240 SYS "OS_Byte",163,242,65 TO s.ze%,
size%,size%
```


Continued ▶

◀ **Mandelbrots *in* Moments listing 1 continued**

```
250 IF size%<&1002C THEN PRINT "Needs SPRITESIZE 9":END
260 DIM block% 24
270 block%!0=150
280 block%!4=149
290 block%!8=-1
300 SYS "OS_ReadVduVariables",block%,block%+12
310 size%=block%!12
320 start%=block%!16
330 IF size%<80*&400 THEN PRINT "Needs SCREENSIZE 10":END
340 VDU 22,13
350 *FX 112,1
360 *FX 113,1
370 ENDPROC
380 :
390 DEF PROCinit
400 @%=&010308
410 OFF
420 VDU 28,32,31,39,0
430 VDU 24,0;0;1023;1023;
440 MOUSE ON
450 PRINT TAB(0,0) "Old Vals---------"
460 PRINT TAB(0,3) "Min X"'''"Min Y"'''"Size"
470 PRINT TAB(0,13) "New Vals--------"
480 PRINT TAB(0,16) "Min X"'''"Min Y"'''"Size"
490 PRINT TAB(0,27) "R-Reset."'"S-Save"
500 ENDPROC
510 :
520 DEF PROCbasemand
530 minX=-2.25
540 minY=-1.5
550 size=3
560 PROCmandelbrot
570 *SNEW
580 MOVE 0,0
590 MOVE 1023,1023
600 *SGET basemand
610 ENDPROC
620 :
630 DEF PROCreturn
640 *SCHOOSE basemand
650 GCOL 0,0
660 PLOT 237,0,0
670 minX=-2.25
680 minY=-1.5
690 size=3
700 ENDPROC
710 :
720 DEF FNzoom
730 GCOL 4,0
740 S%=512:MOUSE TO 256,256
750 PRINT TAB(0,4);minX,TAB(0,7);minY,TAB(0,10);size
760 REPEAT
770 MOUSE RECTANGLE 0,0,1024-S%,1024-S%
780 MOUSE X%,Y%,B%
790 WAIT
800 RECTANGLE X%,Y%,S%-4,S%-4
810 newX=minX+X%*size/1024
820 newY=minY+Y%*size/1024
830 newS=S%*size/1024
840 PRINT TAB(0,17);newX,TAB(0,20);newY,TAB(0,23);newS
850 key$=INKEY$(0)
860 WAIT
870 RECTANGLE X%,Y%,S%-4,S%-4
880 IF key$="S" THEN
890 VDU 28,32,31,39,26,12
900 INPUT "Filename";F$
910 IF F$<>"" THEN OSCLI("SCREENSAVE "+F$)
920 CLS
930 PROCinit
940 ENDIF
950 IF (B% AND 1)=1 AND S%<1024 THEN S%+=16
960 IF (B% AND 4)=4 AND S%>64   THEN S%-=16
970 UNTIL (B% AND 2)=2 OR key$="R"
980 minX=newX:minY=newY:size=newS
990 =NOT (key$="R")
1000 :
1010 DEF PROCmandelbrot
1020 fast%=(size>0.05)
1030 PROCassem(fast%)
1040 CALL mandelbrot
1050 ENDPROC
1060 :
1070 DEF PROCassem(fast%)
1080 resX=320:resY=256
1090 sizX=256:sizY=256
1100 limit=128
1110 FOR pass%=0 TO 2 STEP 2
1120 :
1130 REM Registers that are 'preserved'
1140 x = 0
1150 y = 1
1160 u = 2
1170 v = 3
1180 uu = 4
1190 vv = 5
1200 r = 6
1210 depth = 7
1220 scrn = 8
1230 count = 9
1240 REM Registers that are corrupted by macro
1250 incX = 10
1260 incY = 12
1270 sp = 13
1280 link  = 14
1290 :
1300 P%=code%
1310 [ OPT pass%
1320 .mandelbrot
1330 STR sp, stackS
1340 STR link, linkS
1350 MOV count, #sizX*sizY
1360 LDR scrn, scrnS
1370 LDR y,initY
1380 .loopY
1390 LDR x, initX
1400 .loopX
1410 MOV u, #0
1420 MOV v, #0
1430 MOV depth, #0
1440 .loop
1450 FNmulti(uu,u,u)
1460 BCS exit
1470 FNmulti(vv,v,v)
1480 BCS exit
1490 TST uu, #&E0000000
1500 BNE exit
1510 TST vv, #&E0000000
1520 BNE exit
1530 ADDS r, uu, vv
1540 BCS exit
1550 TST r, #&E0000000
1560 BNE exit
1570 FNmulti(r,u,v)
1580 RSB v, y, r, LSL#1
1590 SUB u, uu, vv
```

Continued ▶

◀ Mandelbrots in Moments listing 1 continued

```
1600 ADD u,u,x
1610 ADD depth, depth, #1
1620 CMP depth, #limit
1630 BNE loop
1640 .exit
1650 STRB depth, [scrn], #1
1660 LDR  incX, incXS
1670 ADD  x, x, incX
1680 SUBS count, count, #1
1690 TST count, #((sizX-1) AND &00FF)
1700 BNE loopX
1710 TST count, #((sizX-1) AND &FF00)
1720 BNE loopX
1730 ADD  scrn, scrn, #(resX-sizX)
1740 LDR  incY, incYS
1750 ADD  y, y, incY
1760 TEQ count, #0
1770 BNE  loopY
1780 LDR sp, stackS
1790 LDR link,linkS
1800 MOVS pc,link
1810 :
1820 .initX  EQUD minX *(1<<27)
1830 .initY  EQUD (minY+size) *(1<<27)
1840 .incXS  EQUD (size/sizX) *(1<<27)
1850 .incYS  EQUD (-size/sizY) *(1<<27)
1860 .scrnS  EQUD start%
1870 .countS EQUD 0
1880 .stackS EQUD 0
1890 .linkS  EQUD 0
1900 ] NEXT
1910 ENDPROC
1920 :
1930 DEF FNmulti(result,num1,num2)
1940 IF fast% THEN
1950 PROCmulti16(result,num1,num2)
1960 ELSE
1970 PROCmulti32(result,num1,num2)
1980 ENDIF
1990 = ""
2000 :
2010 DEF PROCmulti32(ResHigh,num1,num2)
2020 lhs = 10
2030 rhs = 11
2040 work = 12
2050 ResLow = 13
2060 sign  = 14
2070 [ OPT pass%
2080 MOV lhs, num1
2090 MOV rhs, num2
2100 EOR sign, lhs, rhs
2110 TST lhs, #&80000000
2120 RSBNE lhs,lhs,#0
2130 TST rhs, #&80000000
2140 RSBNE rhs,rhs,#0
2150 MOV work, lhs, LSR #&10
2160 MOV ResHigh, rhs, LSR #&10
2170 BIC lhs, lhs, work, LSL #&10
2180 BIC rhs, rhs, ResHigh, LSL #&10
2190 MUL ResLow, lhs, rhs
2200 MUL rhs, work, rhs
2210 MUL lhs, ResHigh, lhs
2220 MUL ResHigh, work, ResHigh
2230 ADDS lhs, rhs, lhs
2240 ADDCS ResHigh,ResHigh,#&10000
2250 ADDS ResLow, ResLow, lhs, LSL #&10
2260 ADC ResHigh, ResHigh, lhs, LSR #&1
0
2270 TST sign, #&80000000
2280 RSBNE ResHigh, ResHigh, #0
2290 MOVS ResHigh, ResHigh, LSL #&5
2300 ADD ResHigh, ResHigh, ResLow, LSR
#&1B
2310 ]
2320 ENDPROC
2330 :
2340 DEF PROCmulti16(ResHigh,num1,num2)
2350 lhs    = 10
2360 rhs    = 11
2370 [ OPT pass%
2380 MOV lhs, num1, ASR #&E
2390 MOV rhs, num2, ASR #&E
2400 MUL ResHigh, lhs, rhs
2410 MOVS ResHigh, ResHigh, LSL #&1
2420 ]
2430 ENDPROC
```

See Arc Windows Without Pain, page 95

Listing 1. Single window demo

```
 10 REM Windows Demo 1
 20 REM by Chris Adie
 30 REM for Arc only
 40 REM (C) Acorn User March 1988
 50 :
 60 MODE 12
 70 ON ERROR PROCerror
 80 *FX 4,1
 90 *FX 200,1
 100 PROCsysvars
 110 PROCcolours
 120 PROCdefinewimpcharacters
 130 DIM block &300
 140 SYS init
 150 SYS frcrdrw,-1,0,0,1279,1023
 160 *POINTER
 170 window%=FNcreatewindow("Target",&0
F,black,white,1279,1023,10,10,400,400)
 180 PROCopenwindow(window%,FALSE)
 190 finished%=FALSE
 200 :
 210 REPEAT
 220 event%=FNpoll(0)
 230 PROCaction(event%,finished%)
 240 UNTIL finished%
 250 :
 260 *FX 4,0
 270 *FX 200,0
 280 MODE 12
 290 END
 300 :
 310 DEF FNpoll(mask%)
 320 LOCAL a%
 330 block!0=mask%
 340 SYS poll,0,block TO a%
 350 =a%
 360 :
 370 DEF PROCaction(evnt%,RETURN end%)
 380 CASE evnt% OF
 390 WHEN 0 :
 400 WHEN 1 :
 410 PROCredrawwindow(block!0)
 420 WHEN 2 :
 430 PROCopenwindow(block!0,TRUE)
 440 WHEN 3 :
 450 PROCclosewindow(block!0)
 460 end%=TRUE
 470 WHEN 4 :
```

Continued ▶

◀ **Arc Windows listing 1 continued**

```
  480 WHEN 5 :
  490 WHEN 6 :
  500 WHEN 7 :
  510 WHEN 8 :
  520 WHEN 9 :
  530 ENDCASE
  540 ENDPROC
  550 :
  560 DEF PROCopenwindow(handle%,full%)
  570 block!0=handle%
  580 IF NOT full% THEN SYS getw,0,block
  590 SYS openw,0,block
  600 ENDPROC
  610 :
  620 DEF PROCredrawwindow(handle%)
  630 LOCAL more%,x0%,y0%
  640 block!0=handle%
  650 SYS redraww,0,block TO more%
  660 PROClwaorigin(block+4,x0%,y0%)
  670 WHILE more%
  680 PROCdraw(x0%,y0%)
  690 SYS getr,0,block TO more%
  700 ENDWHILE
  710 ENDPROC
  720 :
  730 DEF PROCclosewindow(handle%)
  740 block!0=handle%
  750 SYS closew,0,block
  760 ENDPROC
  770 :
  780 DEF PROClwaorigin(b,RETURN x%,RETU
RN y%)
  790 x%=b!0-b!16
  800 y%=b!12-b!20
  810 ENDPROC
  820 :
  830 DEF PROCdraw(x0%,y0%)
  840 LOCAL i%
  850 FOR i%=300 TO 50 STEP -50
  860 GCOL i% DIV 50
  870 CIRCLE FILL x0%+640,y0%+512,i%
  880 NEXT
  890 GCOL black
  900 MOVE x0%+100,y0%+932
  910 PRINT "This is a sample window, sh
owing the scrolling features of the"
  920 MOVE x0%+100,y0%+900
  930 PRINT "Window Manager module in th
e Acorn Archimedes microcomputer."
  940 MOVE x0%+100,y0%+100
  950 PRINT "This is in Black. ";
  960 GCOL green:PRINT "This is in green
. ";
  970 GCOL blue:PRINT "This is in blue.
";
  980 GCOL red:PRINT "This is in red.";
  990 MOVE x0%+100,y0%+132
 1000 GCOL cyan:PRINT "This is in cyan.
";
 1010 GCOL magenta:PRINT "This is in mag
enta. ";
 1020 GCOL midgrey:PRINT "This is in mid
-grey. ";
 1030 ENDPROC
 1040 :
 1050 DEF PROCcolours
 1060 black=0
 1070 red=1
 1080 green=2
 1090 yellow=3
 1100 blue=4
 1110 magenta=5
 1120 cyan=6
 1130 white=7
 1140 midgrey=15
 1150 scrollbarfgcol=14
 1160 scrollbarbgcol=13
 1170 highlightbgcol=red
 1180 titlefgcol=12
 1190 titlebgcol=scrollbarfgcol
 1200 VDU 19,0,24,128,128,128
 1210 VDU 19,15,16,128,128,128
 1220 VDU 19,14,16,15*16,11*16,6*16
 1230 VDU 19,13,16,0*16,12*16,15*16
 1240 VDU 19,12,16,0*16,0*16,8*16
 1250 VDU 19,11,16|
 1260 VDU 19,10,16|
 1270 VDU 19,9,16|
 1280 VDU 19,8,16|
 1290 ENDPROC
 1300 :
 1310 DEF PROCsysvars
 1320 wimp=&400C0
 1330 init=wimp+0
 1340 createw=wimp+1
 1350 createi=wimp+2
 1360 deletew=wimp+3
 1370 deletei=wimp+4
 1380 openw=wimp+5
 1390 closew=wimp+6
 1400 poll=wimp+7
 1410 redraww=wimp+8
 1420 updatew=wimp+9
 1430 getr=wimp+10
 1440 getw=wimp+11
 1450 getwi=wimp+12
 1460 seti=wimp+13
 1470 geti=wimp+14
 1480 getp=wimp+15
 1490 drag=wimp+16
 1500 frcrdrw=wimp+17
 1510 setcaret=wimp+18
 1520 getcaret=wimp+19
 1530 createm=wimp+20
 1540 decodem=wimp+21
 1550 whichi=wimp+22
 1560 setextent=wimp+23
 1570 ENDPROC
 1580 :
 1590 DEF FNcreatewindow(title$,flags%,f
gcol%,bgcol%,maxx%,maxy%,wal%,wab%,war%,
wat%)
 1600 LOCAL handle%
 1610 block!0=wal%
 1620 block!4=wab%
 1630 block!8=war%
 1640 block!12=wat%
 1650 block!16=0
 1660 block!20=maxy%
 1670 block!24=-1
 1680 block!28=flags%
 1690 block?32=titlefgcol
 1700 block?33=titlebgcol
 1710 block?34=fgcol%
 1720 block?35=bgcol%
 1730 block?36=scrollbarbgcol
 1740 block?37=scrollbarfgcol
 1750 block?38=highlightbgcol
 1760 block?39=0
 1770 block!40=0
 1780 block!44=0
 1790 block!48=maxx%
 1800 block!52=maxy%
 1810 block!56=&2D
 1820 block!60=&3000
 1830 $(block+72)=LEFT$(title$,11)
 1840 block!84=0
 1850 SYS createw,0,block TO handle%
```

Continued ▶

◀ Arc Windows listing 1 continued

```
1860 =handle%
1870 :
1880 DEF PROCdefinewimpcharacters
1890 REM lines 1900-2050 are not needed
with Arthur > 0.2
1900 VDU 23,128,102,0,60,102,126,102,10
2,0
1910 VDU 23,129,240,144,240,31,31,31,31
,0
1920 VDU 23,130,224,224,224,31,17,17,31
,0
1930 VDU 23,131,254,146,146,242,130,130
,254,0
1940 VDU 23,132,102,153,129,66,129,153,
102,0
1950 VDU 23,133,252,252,255,225,225,33,
63,0
1960 VDU 23,134,102,0,102,102,102,102,6
0,0
1970 VDU 23,135,126,195,157,177,157,195
,126,0
1980 VDU 23,136,24,40,79,129,79,40,24,0
1990 VDU 23,137,24,20,242,129,242,20,24
,0
2000 VDU 23,138,60,36,36,231,66,36,24,0
2010 VDU 23,139,24,36,66,231,36,36,60,0
2020 VDU 23,140,48,24,60,6,62,102,62,0
2030 VDU 23,141,48,24,60,102,126,96,60,
0
2040 VDU 23,142,102,0,60,102,126,96,60,
0
2050 VDU 23,143,60,102,60,102,126,96,60
,0
2060 ENDPROC
2070 :
2080 DEF PROCerror
2090 MODE 12
2100 *FX 4,0
2110 *FX 200,0
2120 REPORT:PRINT " at line ";ERL
2130 END
```

Listing 2. Multiple window demo

Listings 2 and 3 also require PROCcolours, PROCsysvars, FNcreatewindow, PROCdefinewimpcharacters and PROCCerror from listing 1. Add these procedures onto the end of the listing

```
10 REM Windows Demo 2
20 REM by Chris Adie
30 REM for Arc only
40 REM (C) Acorn User March 1988
50 :
60 MODE 12
70 ON ERROR PROCerror
80 *FX 4,1
90 *FX 200,1
100 PROCsysvars
110 PROCcolours
120 PROCdefinewimpcharacters
130 DIM block &300
140 SYS init
150 SYS frcrdrw,-1,0,0,1279,1023
160 *POINTER
170 maxindex=3
180 DIM window%(maxindex)
190 DIM window$(maxindex)
200 DATA "Circles","Ellipses","Rectang
les"
210 FOR i%=1 TO maxindex
220 READ window$(i%)
230 window%(i%)=FNcreatewindow(window$
(i%),&0F,black,white,1279,1023,100*i%,15
0+100*i%,400+100*i%,650+100*i%)
```

Continued ▶

◀ Arc Windows listing 2 continued

```
240 PROCopenwindow(window%(i%),FALSE)
250 NEXT i%
260 :
270 REPEAT
280 PROCaction(FNpoll(0))
290 UNTIL FNfinished
300 :
310 *FX 4,0
320 *FX 200,0
330 MODE 12
340 END
350 :
360 DEF FNpoll(mask%)
370 LOCAL a%
380 block!0=mask%
390 SYS poll,0,block TO a%
400 =a%
410 :
420 DEF PROCaction(evnt%)
430 CASE evnt% OF
440 WHEN 0 :
450 WHEN 1 :
460 PROCredrawwindow(block!0)
470 WHEN 2 :
480 PROCopenwindow(block!0,TRUE)
490 WHEN 3 :
500 PROCclosewindow(block!0)
510 window%(FNwhichwindow(block!0))=-1
520 WHEN 4 :
530 WHEN 5 :
540 WHEN 6 :
550 WHEN 7 :
560 WHEN 8 :
570 WHEN 9 :
580 ENDCASE
590 ENDPROC
600 :
610 DEF PROCopenwindow(handle%,full%)
620 block!0=handle%
630 IF NOT full% THEN SYS getw,0,block
640 SYS openw,0,block
650 ENDPROC
660 :
670 DEF PROCredrawwindow(handle%)
680 LOCAL more%,x0%,y0%,i%,name$,junk
690 i%=FNwhichwindow(handle%)
700 name$=window$(i%)
710 block!0=handle%
720 SYS redraww,0,block TO more%
730 PROClwaorigin(block+4,x0%,y0%)
740 WHILE more%
750 junk=EVAL("FNdraw"+name$+"(x0%,y0%
)")
760 SYS getr,0,block TO more%
770 ENDWHILE
780 ENDPROC
790 :
800 DEF PROCclosewindow(handle%)
810 block!0=handle%
820 SYS closew,0,block
830 ENDPROC
840 :
850 DEF PROClwaorigin(b,RETURN x%,RETU
RN y%)
860 x%=b!0-b!16
870 y%=b!12-b!20
880 ENDPROC
890 :
900 DEF FNdrawCircles(x0%,y0%)
910 LOCAL i%
920 FOR i%=300 TO 50 STEP -50
930 GCOL i% DIV 50
940 CIRCLE FILL x0%+640,y0%+512,i%
950 NEXT i%
960 GCOL black
```

Continued ▶

◄ Arc Windows listing 2 continued

```
 970 MOVE x0%+100,y0%+932
 980 PRINT "This is a sample window, sh
owing the scrolling features of the"
 990 MOVE x0%+100,y0%+900
 1000 PRINT "Window Manager module in th
e Acorn Archimedes microcomputer."
 1010 MOVE x0%+100,y0%+100
 1020 PRINT "This is in Black. ";
 1030 GCOL green:PRINT "This is in green
. ";
 1040 GCOL blue:PRINT "This is in blue.
";
 1050 GCOL red:PRINT "This is in red.";
 1060 MOVE x0%+100,y0%+132
 1070 GCOL cyan:PRINT "This is in cyan.
";
 1080 GCOL magenta:PRINT "This is in mag
enta. ";
 1090 GCOL midgrey:PRINT "This is in mid
-grey. ";
 1100 =0
 1110 :
 1120 DEF FNdrawEllipses(x0%,y0%)
 1130 LOCAL i%
 1140 FOR i%=1 TO 6
 1150 GCOL i%
 1160 ELLIPSE FILL x0%+640,y0%+512,80*i%
,80*(7-i%)
 1170 NEXT i%
 1180 GCOL black
 1190 MOVE x0%+100,y0%+932
 1200 PRINT "This is a sample window con
taining a stack of overlapping";
 1210 MOVE x0%+100,y0%+900
 1220 PRINT "ellipses. The window is cal
led 'Ellipses'"
 1230 GCOL magenta
 1240 MOVE x0%+100,y0%+132
 1250 PRINT "Try changing routine 'FNdra
wellipses' to do something different."
 1260 =0
 1270 :
 1280 DEF FNdrawRectangles(x0%,y0%)
 1290 LOCAL i%
 1300 FOR i%=1 TO 6
 1310 GCOL i%
 1320 RECTANGLE FILL x0%+200+i%*60,y0%+5
12-i%*60,120*(7-i%),120*i%
 1330 NEXT i%
 1340 GCOL black
 1350 MOVE x0%+100,y0%+900
 1360 PRINT "Sample window containing a
stack of overlapping rectangles."
 1370 GCOL midgrey
 1380 MOVE x0%+100,y0%+100
 1390 PRINT "The name of this window is
'Rectangles'."
 1400 =0
 1410 :
 1420 DEF FNfinished
 1430 LOCAL finished,i%
 1440 finished=TRUE
 1450 FOR i%=1 TO maxindex
 1460 IF window%(i%)<>-1 THEN finished=F
ALSE
 1470 NEXT i%
 1480 =finished
 1490 :
 1500 DEF FNwhichwindow(handle%)
 1510 LOCAL i%,this%
 1520 i%=1:this%=-1
 1530 FOR i%=1 TO maxindex
 1540 IF window%(i%)=handle% THEN this%=
i%
 1550 NEXT
 1560 =this%
```

Listing 3. Notepad window demo

```
 10 REM Windows Demo 3
 20 REM by Chris Adie
 30 REM for Arc only
 40 REM (C) Acorn User March 1988
 50 :
 60 MODE 12
 70 ON ERROR PROCerror
 80 *FX 4,1
 90 *FX 200,1
 100 PROCsysvars
 110 PROCcolours
 120 PROCdefinewimpcharacters
 130 DIM block &300
 140 SYS init
 150 SYS frcrdrw,-1,0,0,1279,1023
 160 *POINTER
 170 maxindex=3
 180 DIM window%(maxindex)
 190 DIM window$(maxindex)
 200 DIM text$(maxindex,25)
 210 DIM xpos%(maxindex)
 220 DIM ypos%(maxindex)
 230 chx%=16
 240 chy%=40
 250 :
 260 DATA "Window 1","Window 2","Window
 3"
 270 FOR i%=1 TO maxindex
 280 READ window$(i%)
 290 FOR j%=1 TO 25
 300 text$(i%,j%)=STRING$(80," ")
 310 NEXT j%
 320 xpos%(i%)=1
 330 ypos%(i%)=1
 340 window%(i%)=FNcreatewindow(window$
(i%),&0F,black,white,1279,1023,100*i%,15
0+100*i%,400+100*i%,650+100*i%)
 350 PROCopenwindow(window%(i%),FALSE)
 360 NEXT i%
 370 :
 380 REPEAT
 390 PROCaction(FNpoll(0))
 400 UNTIL FNfinished
 410 :
 420 *FX 4,0
 430 *FX 200,0
 440 MODE 12
 450 END
 460 :
 470 DEF FNpoll(mask%)
 480 LOCAL a%
 490 block!0=mask%
 500 SYS poll,0,block TO a%
 510 =a%
 520 :
 530 DEF PROCaction(event%)
 540 CASE event% OF
 550 WHEN 0 :
 560 WHEN 1 :
 570 PROCredrawwindow(block!0)
 580 WHEN 2 :
 590 PROCopenwindow(block!0,TRUE)
 600 WHEN 3 :
 610 PROCclosewindow(block!0)
```

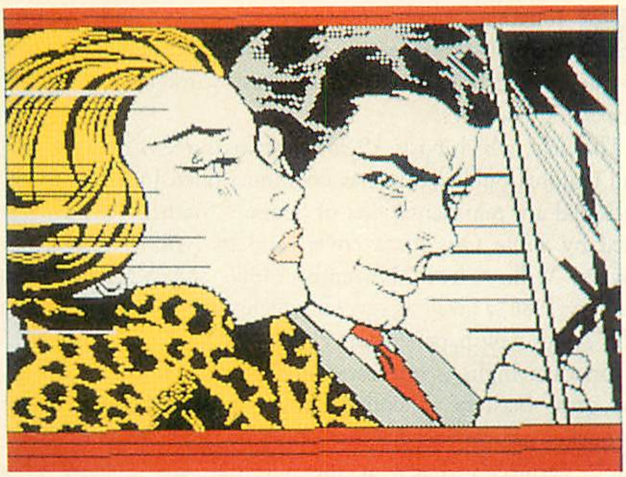
Continued ►

◀ **Arc Windows listing 3 continued**

```
620 window%(FNwhichwindow(block!0))=-1
630 WHEN 4 :
640 WHEN 5 :
650 WHEN 6 :
660 PROCbuttonchange
670 WHEN 7 :
680 WHEN 8 :
690 PROCkeypressed
700 WHEN 9 :
710 ENDCASE
720 ENDPROC
730 :
740 DEF PROCopenwindow(handle%,full%)
750 block!0=handle%
760 IF NOT full% THEN SYS getw,0,block
770 SYS openw,0,block
780 ENDPROC
790 :
800 DEF PROCredrawwindow(handle%)
810 LOCAL more%,x0%,y0%,i%
820 i%=FNwhichwindow(handle%)
830 block!0=handle%
840 SYS redraww,0,block TO more%
850 PROClwaorigin(block+4,x0%,y0%)
860 WHILE more%
870 PROCwritetext(x0%,y0%,i%)
880 SYS getr,0,block TO more%
890 ENDWHILE
900 ENDPROC
910 :
920 DEF PROCclosewindow(handle%)
930 block!0=handle%
940 SYS closew,0,block
950 ENDPROC
960 :
970 DEF PROClwaorigin(b,RETURN x%,RETURN y%)
980 x%=b!0-b!16
990 y%=b!12-b!20
1000 ENDPROC
1010 :
1020 DEF PROCbuttonchange
1030 LOCAL i%
1040 i%=FNwhichwindow(block!12)
1050 IF ((block!8 AND %100)<>0) AND (block!12<>-1) THEN PROCcursor(i%,xpos%(i%),ypos%(i%))
1060 ENDPROC
1070 :
1080 DEF PROCkeypressed
1090 LOCAL i%,col%,row%,x1%,y1%,x2%,y2%
1100 i%=FNwhichwindow(block!0)
1110 col%=xpos%(i%)
1120 row%=ypos%(i%)
1130 CASE block!24 OF
1140 WHEN 13:
1150 row%+=1
1160 col%=1
1170 WHEN 7,136:
1180 col%-=1
1190 WHEN 137
1200 col%+=1
1210 WHEN 139
1220 row%-=1
1230 WHEN 138
1240 row%+=1
1250 OTHERWISE:
1260 block!24=block!24 AND &7F
1270 MID$(text$(i%,row%),col%,1)=CHR$(block!24)
1280 x1%=4+chx%*(col%-1)
1290 y1%=1024-12-chy%*row%
1300 x2%=x1%+chx%
1310 y2%=y1%+chy%
1320 SYS frcrdrw,block!0,x1%,y1%,x2%,y2%
1330 col%+=1
1340 ENDCASE
1350 IF col%>80 THEN col%=1:row%+=1
1360 IF col%<1 THEN col%=80:row%-=1
1370 IF (row%>25)OR(row%<1) THEN ENDPROC
1380 PROCcursor(i%,col%,row%)
1390 xpos%(i%)=col%
1400 ypos%(i%)=row%
1410 ENDPROC
1420 :
1430 DEF PROCwritetext(x0%,y0%,index%)
1440 LOCAL i%,a%,b%,c%,d%,x1%,y1%,x2%,y2%
1450 PROClwacliprectangle(block+4,x1%,y1%,x2%,y2%)
1460 a%=(1024-12-y2%) DIV chy%+1
1470 b%=(1024-12-y1%) DIV chy%+2
1480 c%=(x1%-4) DIV chx%+1
1490 d%=(x2%-4) DIV chx%+2
1500 d%=d%-c%
1510 PROClimit(1,a%,25)
1520 PROClimit(1,b%,25)
1530 PROClimit(1,c%,80)
1540 PROClimit(1,d%,80)
1550 FOR i%=a% TO b%
1560 MOVE x0%+4+chx%*(c%-1),y0%+1024-20-chy%*(i%-1)
1570 PRINT MID$(text$(index%,i%),c%,d%);
1580 NEXT i%
1590 ENDPROC
1600 :
1610 DEF PROClwacliprectangle(b,RETURN x1%,RETURN y1%,RETURN x2%,RETURN y2%)
1620 LOCAL x0%,y0%
1630 PROClwaorigin(b,x0%,y0%)
1640 x1%=b!24-x0%:y1%=b!28-y0%
1650 x2%=b!32-x0%:y2%=b!36-y0%
1660 ENDPROC
1670 :
1680 DEF PROCcursor(i%,col%,row%)
1690 LOCAL x%,y%
1700 x%=4+chx%*(col%-1)
1710 y%=1024-48-chy%*(row%-1)
1720 SYS setcaret,window%(i%),-1,x%,y%,&1000000 OR 36,-1
1730 ENDPROC
1740 :
1750 DEF PROClimit(lower,RETURN value,upper)
1760 IF value<lower THEN value=lower
1770 IF value>upper THEN value=upper
1780 ENDPROC
1790 :
1800 DEF FNfinished
1810 LOCAL finished,i%
1820 finished=TRUE
1830 FOR i%=1 TO maxindex
1840 IF window%(i%)<>-1 THEN finished=FALSE
1850 NEXT i%
1860 =finished
1870 :
1880 DEF FNwhichwindow(handle%)
1890 LOCAL i%,this%
1900 i%=1:this%=-1
1910 FOR i%=1 TO maxindex
1920 IF window%(i%)=handle% THEN this%=i%
1930 NEXT
1940 =this%
```

OFFERS

PROGRAM LISTINGS



Arc WIMPs and Mandlebrot graphics

Do you find that you can't remember whether you've saved a program or not? If the answer is yes then you will find our First Byte program an essential aid. This routine will automatically save the work you're doing every four minutes.

Forum has also come up with a solution to another common irritant, an overwriter warning program. With this routine you need never again lose valuable work through overwriting files. There is also a program to aid the games fan, easing the use of Atari-type joysticks. Martin Phillips has produced another excellent example of a recursive program, taking his theme from the ancient game 'The Tower of Hanoi'. We have also included a routine to enhance the search facility in *Wordwise Plus*.

We have a number of programs for new Archimedes owners. Forum has produced an Arc disassembler, and there is a feature showing how to produce Mandlebrots using ARM machine code in 30 seconds! Use the program illustrating the use of windows on the Arc and learn to produce your own windows. There is also an Arc graphics bonus. Owners of the Archimedes and Compact should turn to page 13 to see how they can order 3.5-inch discs.

Use our *AutoROM* program, which sits in sideways RAM, to save programs easily to sideways RAM using a *CACHE command. Joe's Jotting's for March gives great examples of the Micro Control Language.

LISTINGS



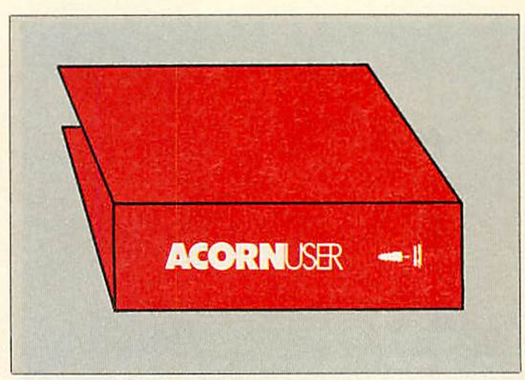
Monthly disc and cassette subscriptions

Guarantee the delivery of your monthly listings by subscribing to our discs and cassettes, for the best quality graphics, utilities and routines. A subscription to the cassettes or discs will save you hours of typing and de-bugging leaving you time to actually enjoy and use the programs.

You can subscribe to the monthly cassettes for the Electron and BBC for just £35 or the discs from £40. Whichever you choose you won't regret the investment.

This offer is only open to UK subscribers.

BINDERS



Vastly reduced prices for disc binders

Our grey cloth disc binder is supplied with its own protective slip case and is filled with six transparent inserts which will hold a year's supply of 5.25-inch monthly discs, and it is currently available at the special price of just £6.95.

An *Acorn User* magazine binder is the best way to keep your precious copies in pristine condition. Our smart red binder features a wide spine with the capacity to hold a whole year's issues. For only £4.95 your magazines can last a lifetime.

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OFFERS

P O R T F O L I O   D I S C



A Portfolio of micro masterpieces

BBC/B/ B+/M Jonathan Inglis, freelance illustrator and Acorn's artist-in-residence for the launch of the Master series, has assembled a portfolio of his best work exclusively for *Acorn User* readers.

The disc, which costs £9.95, contains screens that national and regional publications have commissioned Jonathan to do. Included are representations of Seurat's 'Bathers', which was used by *Time Out* for a cover, and two *Acorn User* front covers; Willow from November 1986 and Magician from January 1986, as well as several which were commissioned by *The Times* newspaper group.

Jonathan Inglis is interested in the conversion of work by the great masters to computer graphics, and three of his favourites are on the disc for you to enjoy: Seurat's 'Riverside', Vermeer's 'Lady at the Virginal' and a copy of a lithograph by Matisse.

Pixel Editor and *Super Painter* have been incorporated to let you create your own masterpieces. *Pixel Editor* allows you draw in and alter the minute detail while *Super Painter* enables you to draw lines, texture your screen and shade by mixing the eight standard colours.

The *Portfolio* disc comes in 80-track 5.25-inch format, and makes the ideal gift for the graphics fan. Enclosed with the disc is a comprehensive instruction sheet telling you more about the pictures and how the artist created them.

D I S C S

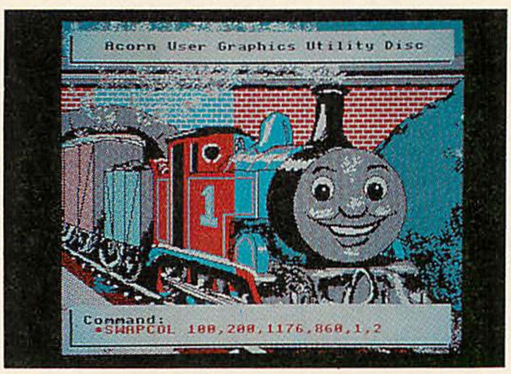


Disc for all sideways RAM users

BBC/B/ B+/M/ C The *Sideways RAM Utilities* disc includes: *Ram-Pad* – your computer's answer to the pad and pen. *On-Screen Fonts* – a variety of print styles available in all graphics modes. * HLP ROM – add your own help text to call up when you're stuck. Standard ROM header for use when writing your own ROMs. * RLOOK to examine the contents of your ROMs and sideways RAM images.

There are many more utilities on this 40-track 5.25-inch disc with a transfer program for 80-track users, and it's competitively priced at £9.95.

G R A P H I C S



Graphics utilities for your screens

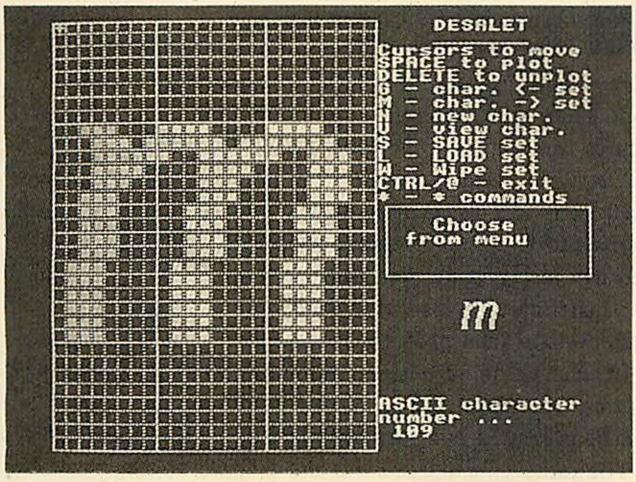
BBC/B/ B+/M/ C The 40-track 5.25-inch *Graphics Utilities* disc, keenly priced at £7.95, features 16 routines to manipulate blocks of graphics: rotation and reflection, a screen compressor/expander, a colour flood-fill routine and three mode conversion commands.

With the Basic procedure library are multi-height, proportional and justified text and 'drop shadow' boxes. A teletext screen editor gives point plotting, line drawing, rubber banding and flood fill, along with all mode 7 control codes. All can be used in your own programs.

***Acorn User* order form on page 133 – 24-hour telephone service (0672) 40825**

OFFERS

CALLIGRAPHY



A new dimension in letter designing

BBC/B/ B+/M

This is your chance to produce your own letterheads and posters to a professional standard, with the minimum of fuss and effort. *Acorn User*'s *Calligraphy* disc has been compiled due to popular demand and contains all the programs needed to produce letter designs that will impress your friends and colleagues.

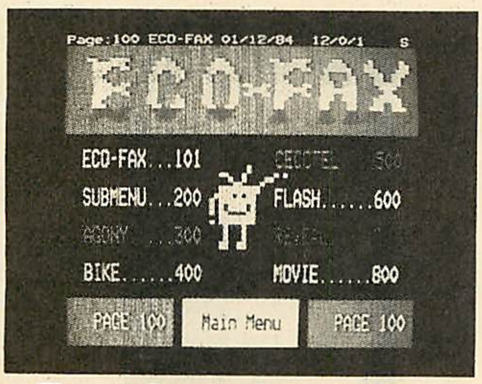
The *Desalet* program is a simple font creator which produces customised letters, to your personal design. It will save you from using repetitive data statements and error prone calculations. You can save your font set on disc and then call it up as needed. All previously saved sets can be modified or added to, and each set covers up to 94 characters.

Modical, a modification of the original *Calligraphy* program (September 1986 *Acorn User*) is also included on the disc. *Modical* allows the use of disc-based font sets created with *Desalet*. *Modical* also incorporates a modified file creation program, which permits files to be printed out immediately or saved for later printing.

An enhanced font ROM in the form of a sideways RAM image, is also on the disc. This allows you to design your own fonts for use on-screen. Any output to the printer will be in the new font – thus giving true WYSIWYG capabilities. There is a selection of new fonts to help you get started.

This superb disc comes in 5.25-inch, 40/80-track format and is great value at only £9.95.

EDUCATION



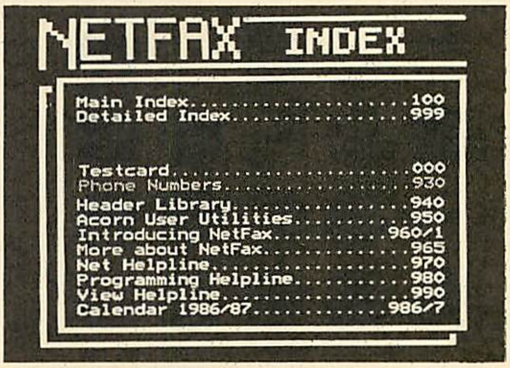
Easy learning with Education disc

BBC/B/ B+/M/ C

The *Acorn User* Education disc makes learning easy and enjoyable. The disc is packed with useful programs, including the *Eco-fax* database for Econets.

Graphics are a strong feature, and included on the disc are *Turtle Logo*, *Easyplot* and *Bulletin*, and you can then show off your creations with *Vufoil* and *Noticeboard* or make music with *Tunemaker*. Also included are an all-mode dumping routine for Epson compatibles and a teletext dumping routine for mode 7 dumping to Epson FX80 compatibles. All this for only £7.95.

NETWORK



Network utilities for better communication

BBC/B/ B+/M/ C

The *Network Utilities* 80-track disc is the logical addition to your network, combining invaluable routines with a sophisticated yet easy-to-use noticeboard.

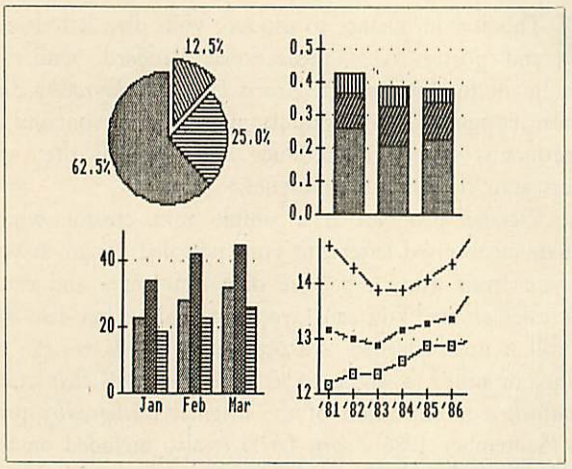
Included is *Netfax*, our own hybrid information system providing access to thousands of pages of information. Other special features are: a file locator and directory size finder; network manager utilities including a bridge compatible screen viewer and a 'notify all' facility.

Plus there are 150 *Netfax* pages covering instructions, help and indexes, all on a 5.25-inch disc for £19.95.

24-hour telephone service (0672) 40825

OFFERS

CHART SOFTWARE



Improve your presentation with ViewChart

BBC/B/ B+/M/ C Do you use your micro to prepare figures? Perhaps in *ViewSheet* or *ViewStore*? Do you make printed reports? This business graphics program from *Acorn User* contributor Peter Sandford is aimed at anyone who uses figures, and wishes to improve the quality of their work.

ViewChart takes your numeric data from a *ViewSheet* or *ViewStore* file, or manual input, and plots various chart formats to screen. In one plot you can produce between one and five piecharts, stacked bar charts up to 25 bars, grouped bar charts up to 24 bars and line graphs with up to five lines each of 40 plotted points.

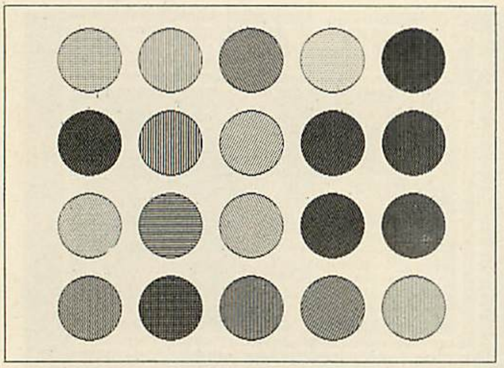
In practice, most business presentation data such as sales figures, departmental breakdowns, cost analyses and so on can be presented in a form even the boss will understand!

You can even add extra text and graphics to the completed chart prior to saving or printing. A screen dump program is provided, for Epson and compatible printers, which is specifically designed to fit the width of an A4 page. Instructions are provided on interfacing to other printers. *ViewChart* works in screen mode 0, using full shading effects, so what you see on screen is what you get on paper, and includes some tips on final presentation of graphics in documents.

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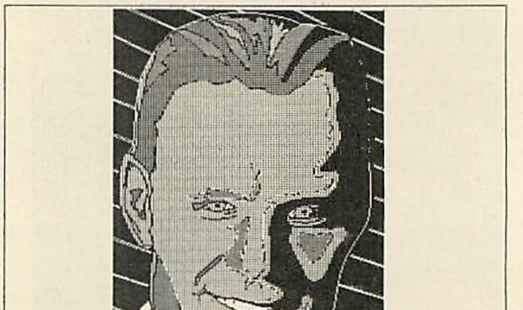


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REVIEWS

THE GAMES PAGE

TANKS CONQUER ARCHIMEDES

David Lawrence presents the latest gossip from the games world, including a new Arc game and tips for *Starquake*

By the time you read this, the third Archimedes game should be out! This latest game has been written by Nicholas Griffiths for Superior and is currently called *Conqueror*. It employs the same plotting routines as David Braben's *Zarch*, but this time you control a tank moving over the surface.

There are actually three games in total. The first is called Arcade and is simply you against them. The second, Attrition, gives you control over six tanks, and you must use your battle strategy to make it through the levels. The last game, Strategy, poses a number of objectives that you must achieve to gain points, in a similar way to the trading missions in *Elite*.

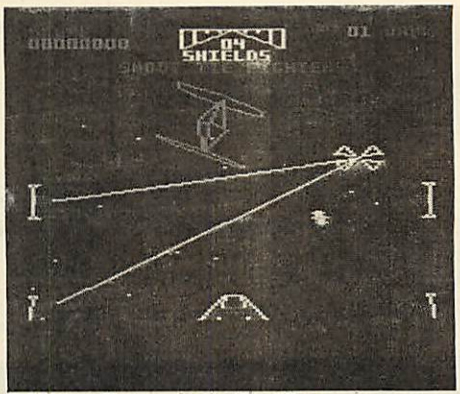
All the graphics and capabilities are based on real American and German tanks. Many of you may have seen a very early version of this game in demo form at the *Acorn User* Show last year.

Back down to earth after the Christmas games rush; the next Beeb game from Superior is going to be something very special. Richard Hanson described it as 'the very best since *Elite*.' I'm calling it 'it' at the moment, as he would not disclose the name to me.

It has come from the pens, or rather processors, of Jeremy Smith and Peter Irving (authors of *Thrust* and *Starship Command* respectively), who have been working on it for about a year. It is similar to an arcade adventure, but according to Hanson that doesn't do it justice. It will be packaged like *Elite* with a novella, and have en enhanced Master version.

Pluribus, Mat Newman's version of *Marble Madness* is coming on, and should appear along with the other games I've mentioned at about the end of February. Finally on Superior, *The Life of Repton* is selling very well – perhaps yet another sequel are in the pipeline.

The only game that has dragged me away from *Bonecruncher* recently is



Taking on the empire in *Star Wars*

HIGHSCORE UPDATE

Arkanoid	381,820	Adam Gorst
Frenzy	581,399	Ian Lay
Labyrinth	348,800	Ian Lay
Plan-B	14,090	Stephen Hewson
Repton 2	29,064	Stephen Hewson
Snapper (Elk)	2,429,198	Ronnie Cusworth
Zarch	673,307	Sam Greenhill

Domark's *Star Wars*. This is a very good implementation of the now somewhat elderly arcade game of the same name. If you haven't seen it, you must fly your X-wing fighter in a last ditch attempt to destroy the Death Star, just like the film. After battling Darth Vader's Tie fighters in space, you fly across the surface of the Death Star before diving into that famous trench and destroying the evil battle fortress with one photon torpedo!

The version I have runs in mode 5, and needs one bank of sideways RAM. It also has no sound or attacking missiles! These have, of course, been put in for the release version, but I'm going to hang onto my current copy of the game, as makes it a lot easier to play!

I think *Star Wars* makes the best use of wire frame graphics since *Elite*, certainly the speed at which everything moves is very impressive for the humble Beeb. The only problem is that some of the shapes appear a bit chunky, it would be nice to see a Master version running in mode 1.

The latest from the budget Top Ten label is *Skirmish*. This is in fact Delos D Harriman's brilliant version of *Joust*, repackaged and sold for £1.99. This represents excellent value for money; rush out and buy a copy! Also in the cut price end of the market, I've received a copy of Atlantis' *Cops and Robbers*. This bears a strong resemblance to some early Spectrum games. Although technically rather simple, it may be for you if you can't 'get into' complex games like *Bonecruncher*.

The latest batch of *Revs* lap times are getting very close to Linus' records. Ian Lay has equalled his Donnington Park time 1:08.5 and came very close on Snetterton with a time of 1:00.7 (only three-tenths slower). Meanwhile Gordon Bell is only one tenth of a second slower on Silverstone at 1:23.2. The most recent updates to the highscore table are in the box.

If you're still stuck playing *Starquake*, here are the teleport codes courtesy of reader Max Palmer:

VILGA	TAMIS	ASOGE	DARAQ
LEXIA	QUARK	ARLON	KOPEX
OTRUN	URIAH	SAMAL	MISES

I have received the following cheat mode for *Last of the Free* from a D Salt who says 'After transferring all the files to disc, to get infinite energy type:

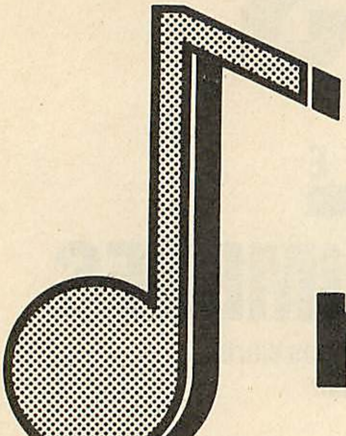
```
B%=OPENUP"FREE2"
PTR#B%=410
BPUT#B%,62
CLOSE#0
```

then type *FREE to run the program as usual. If you have Basic 1 then use OPENIN instead of OPENUP.'

Finally, I've been sent the first few sections of an *Acheton* map from Alex Hopkins. These look very good, so they may become available soon.

Send your games tips and highscores to Dave Lawrence, Acorn User, *20-26 Brunswick Place, London N1 6DJ.*

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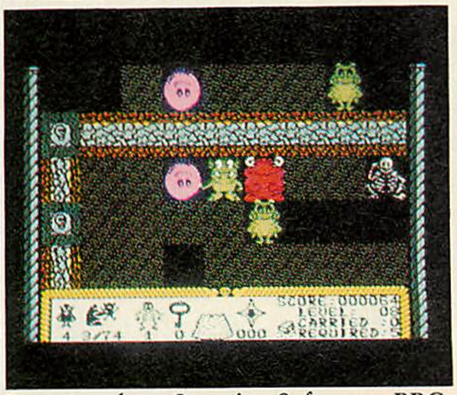
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SOAP OPERA



Bonecruncher; Superior Software; BBC, Master, Compact, Electron; £11.95 (5.25-inch disc), £9.95 (cassette), £14.95 (3.5-inch disc)

They always say first impressions are important. When I first saw *Bonecruncher,* I thought Superior had designed some new screens for *Repton 3.* But after five minutes, I'd found this was far from the truth and I've been crunching bones ever since.

The *Repton* similarity is quite marked; you play the part of some reptile and must wander around a number of screens collecting skeletons. Your character is called Bono; I wonder if the author likes U2?

Of course, various monsters try to stop you. When you have five skeletons, the bone crunching bit starts. First you must find a cauldron, make some soap, and then take it to the bathing monsters upstairs. You may laugh, but this is serious small business! After five soapy deliveries, you move onto the next level, of which there are 24.

There are three types of enemy creatures, and for a change, a friend! The monsters head straight for you, spiders follow the left hand wall and glooks move towards your last soap delivery. All monsters kill you on contact, but can be trapped in corners. Here, they will suffocate and you can collect their bones. This is vital on later levels as there are not enough 'natural' skeletons at the start to make the soap. Glooks behave rather like *Repton* boulders, but can move in any direction. They can also be pushed about.

Your friend is called Fozzy; he is rather stupid, but protects you from monsters and can only be killed if he gets trapped. Talking of traps, there are two to look out for; the first is trapdoor that kills anything that touches it, the other is a 'volcano' that erupts glooks once uncovered!

The game is technically very good. The screen is laid-out well, and clever use of swapping between two screens creates very smooth scrolling, if a little slow. But at least, as far as I can see, it never gets any slower. A catchy tune adds a lot to the atmosphere. The packaging is also very nice, with a comic strip to introduce you to the characters.

My only criticisms are that there is no highscore table of any sort, and the picture that appears whenever you deliver some soap gets very tedious. Also, even on the Master versions, the screens are loaded in in four sets of six – some sort of sideways RAM storage would have been very nice.

Bonecruncher is a 'proper' sequel to *Repton* – the idea is similar, but the overall game is very different. It looks like another Superior hit.

David Lawrence

HUNTING HIGH AND LOW

The Hunt; Robico Software; BBC; £9.95 (cassette), £12.95 (disc)

The Hunt is a graphical adventure set in space. Your task is to rescue one of your ship's crew who has been kidnapped.

You start the game in a space-ship. You must keep your wits about you when starting the game, otherwise you get killed before you know what has hit you. In only 60 seconds your space-ship opens itself to outer space.

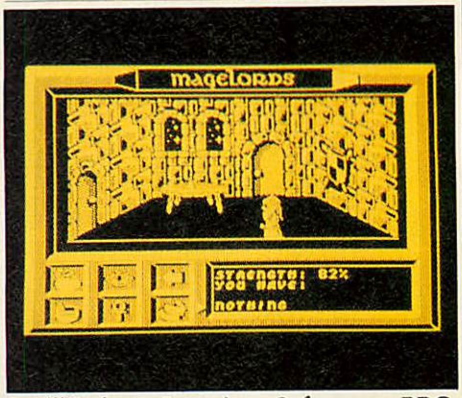
The adventure contains many animated characters – some are helpful, but others are not so friendly.

The graphics are adequate, although small. They are loaded from disc, which becomes irritating as there is no way to stop the re-displaying of pictures when returning to a location except by turning the graphics off completely.

There are a few nice touches in the form of natty puzzles and humourous place names. Overall it's a good game, although nothing new. Don't, however, take this to mean that it's easy. I had to use the cheat sheet to finish!

Gavin Gillings

UNDER A SPELL



Spellbinder; Superior Software; BBC, Master, Compact, Electron; £9.95 (cassette), £11.95 (5.25-inch disc), £14.95 (3.5-inch disc)

Back in the dark ages, in the land of Lorraine, Zorn the evil Magelord has deserted the brotherhood and fled to the castle. You take on the role of Eldon The Spellbinder, and your task is to search the castle for Zorn and cast the ultimate spell.

Playing *Spellbinder* is very easy – just four directional keys are used, with an icon system for controlling your actions. This uses six function keys, and game play is made considerably easier if you make yourself a little function key strip. It's a pity that one is not provided.

During your travels through the castle, you come across open chests, pictures, suits of armour, bookcases and other items from which you can obtain clues, ingredients for spells, and the pestle and mortar, vital to mix new spells.

Your journey through the castle is made much more hazardous by the inhabitants. If they catch you, they take a percentage of your energy. Some are more powerful than others, for instance, a death monk will take eight per cent, while a black witch only takes three per cent.

An enjoyable game is made much better by having a volume level control, rather than a simple on or off toggle. One poor feature of the game is the sprites – an unsightly black border often appears around them. I am sure that this could have been easily removed.

Spellbinder is worth playing – but £15 is a lot for an Electron or Compact game.

Richard Bellis

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GAMES

NOT LIKE A HURRICANE



Spitfire 40; Mirrorsoft; BBC B, Master; £10.95 (5.25-inch disc), £12.95 (3.5-inch) £7.95 (cassette)

Spitfire 40 is a flight program for the BBC B, B+ and the Master. You are an inexperienced fighter pilot and it's the summer of 1940. Your aim is to rise through the ranks gaining medals on the way.

A rookie pilot needs practice before facing the enemy. The practice mode of the game allows you to master the techniques of take off, landing and general control of the Spitfire. After a successful landing your flight log may be saved and your level of experience recorded.

The combat mode is the main section of the game, in which you are given instructions detailing the number, height and bearing of enemy planes. Intercepting the enemy increases your experience level.

The graphics are reasonable. The instrument panel is adequate, and at low altitudes buildings and other features are visible.

The flight simulation is light years behind *Aviator.* Takeoffs, landings and generally flying are not much of a challenge (the detailed manual states that the program is forgiving of errors in the early stages). It displays almost none of the characteristics of a real aircraft – let alone the touchy, high-performance Spitfire.

This is most definitely a game, not a simulation. However, if you can rise to the challenge of finding the enemy planes, the combat game is quite enjoyable.

Overall *Spitfire 40* is a reasonable arcade game. The idea of working your way up the ranks adds extra interest which just about makes up for its severe limitations in other areas.

Ashley North

THREE'S A CROWD

Peter Scott Compilation; Top Ten; BBC, Electron; £1.99 (cassette)

There are three games in this compilation, *Pandemonium, Network* and *Yoyo.* All three are virtually identical, apart from slight changes in graphics. In each you have the task of controlling a character which must go around a series of rooms collecting objects, all in true arcade adventure style.

In each screen there are monsters on the loose. Contact with these is fatal. To help you on your way you are equipped with a weapon. In *Pandemonium* and *Network* you are in possession of a laser, while *Yoyo* allows the use of a force shield, which will happily destroy any monsters that get in your way.

The similarity between these three games is so marked that while testing them, a colleague failed to notice that I had stopped playing *Pandemonium* and changed instead to *Yoyo.*

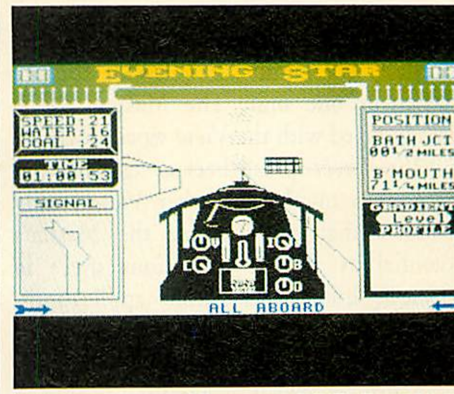
Each game does, however, have its own peculiarities. For example, in *Pandemonium,* if you land on top of a monster you will find that you can remain there for as long as you wish without ill affect. If this is tried in *Network,* you lose energy. *Yoyo* goes the whole hog, as it were, and kills you off outright as soon as you come in contact with one of the nasties.

There are some nice features in the games – for example, the screen being cleared by scrolling the graphics off when you die. In *Network* there is a nice little jingle part way through loading. What it's there for I don't know, but it sounds good. And while I'm on the subject of sound, the music in *Yoyo* is identical to that in *Last of the Free.*

If you have a hankering to try an arcade adventure, and have not yet had the chance to play *Last of the Free,* then these games might be worth looking at. However, I would advise anyone considering this compilation not to regard it as three games but more like one game with three different sets of screens and graphics. Despite that, at only £1.99 it still represents excellent value for money.

Gavin Gillings

SPOT THE TRAIN



Evening Star; Hewson; BBC B; £14.95 (disc) £9.95 (cassette)

Evening Star was one of the most powerful steam locomotives in the British Rail fleet and this locomotive simulation from Hewson does it justice. You play the roles of both driver and fireman in the cab and must take the engine on a journey between Bath and Bournemouth attempting to run to the timetable despite various obstacles.

The software appears to be a re-run of *Southern Belle,* which has been around for a while, with new journeys. However, it's still worth exploring.

Once the controls have been mastered (using the practice run option) you are ready to undertake a real journey. In all there are seven journeys, from the simple training run using few controls to high speed runs using all the controls and hazards such as speed limits and signals.

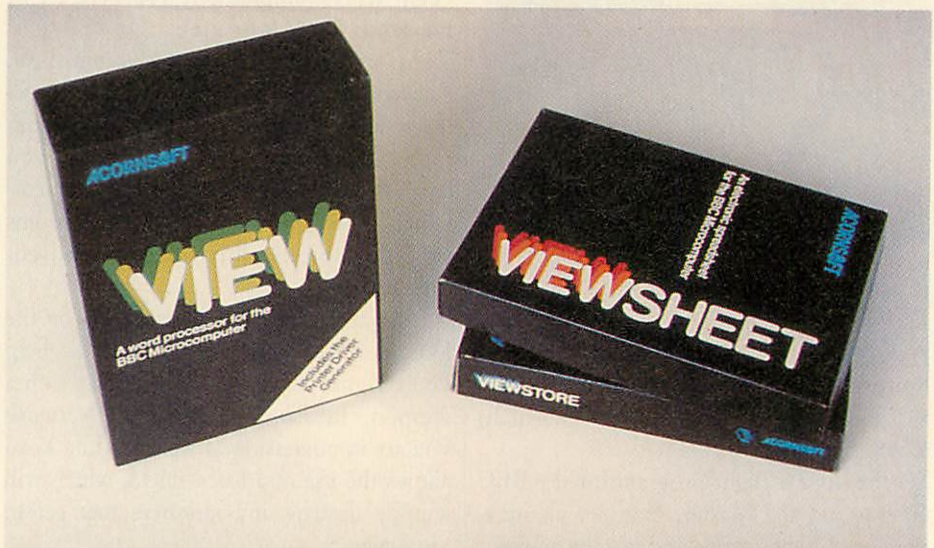
The graphics used for the simulation are adequate for a Beeb. The dials and controls within the cab, and the stations and signals at the trackside are clearly seen. Unfortunately the track is often difficult to see and little trackside scenery is in evidence.

My first impressions were poor. However, after mastering the controls I find myself returning to *Evening Star* time after time. Stopping and starting at stations, increasing and decreasing power or braking at the correct time and avoiding 'explosive blowback' in tunnels while attempting to complete the journey on time is a rewarding challenge. Overall, *Evening Star* is an excellent simulation, which can be played on many levels. I would recommend it to anyone interested in locomotives or simulations.

Ashley North

UNITY IS STRENGTH

Acornsoft's *OverView* links the *View* family together and makes it much more powerful, finds Clive Williamson



In the family: *OverView* integrates the other *View* packages

OverView offers a simple way of obtaining all the *View* family of software for the Master in one unit. The Master 128 is already fitted with the *View* wordprocessor and *ViewSheet* spreadsheet as standard, but there are a number of other *View* family products that can increase the Master's potential as an aid to serious users in business, home and school applications. *OverView* consists of all the disc-based programs – *ViewPlot*, *ViewIndex* and the *View* printer driver generator, a plug-in ROM cartridge, and all the associated manuals. The cartridge holds *ViewSpell* and the *ViewStore* database manager, and their dictionary and utility discs are included too.

Once the cartridge is in place in your Master 128, information about all the *View* applications is available through a *HELP command, so that you can find out about the software from the keyboard without the need to refer to manuals frequently, and several new star commands are available with the package.

*WIDE enables more characters to be shown on the standard BBC micro screen display. It works in any of the two-colour modes – 0, 3, 4 and 6, and their shadow equivalents – and gives you either 106 characters instead of 80, or 53 characters instead of 40.

The 106-column display is very difficult to read on normal TV sets and low or medium resolution colour monitors, but is reasonably legible on high-resolution monitors. It is very useful when, for instance, you need to see large parts of a *ViewSheet* spreadsheet in one go. The 53-column display is an ideal size for medium and low resolution monitors or TVs, once again giving you a bigger window onto your work.

The effect is activated by entering *WIDE ON, and removed by typing *WIDE OFF, then changing mode. A necessary evil of this type of display is that it is slower than the normal screen modes, and the cursor is seen as a thin, steady line – not easy to spot in the text. The *WIDE feature works with all the *View* family langauges and Basic, but does not work with the Master's *Terminal* program.

*KEEP is an extremely useful new command geared to better integration of the *View* range. The 'Keeper' can set up a set of large file – either on disc or in the Master's sideways RAM area – to hold almost the entire memory of the computer when you change from one *View* language to another. This is refered to as the 'context' of the language. For example, if you were writing a document on the *View* wordprocessor but needed to refer to *ViewSheet* to *SPOOL a table of information for inclusion in your document, you would normally save your text from the wordprocessor, enter *ViewSheet* and do the work there, then restart *View*. You would then have to reload the text file you were working on, and reset any special conditions like insert mode or the location of markers. If the Keeper is active when you do this however, the text, marker positions, state of formatting and so on – in fact the entire contents of memory – are preserved in a disc file. The files are called context files. You can then do what you like using another language such as *ViewSheet* or *ViewStore*. On returning to *View*, you will find everything there just as you left it. The Keeper reloads everything from disc or RAM. The command to save onto disc is *KEEP ON, and the command can be followed by the optional specification of a disc drive or directory name to hold the *KEEP files – there are three per language – so they don't have to be held on the current drive if you have a multi-drive system. If several *View* family languages are kept on disc, they will all be stored separately, so that you can retrieve them, either during the current session, or later. In fact, you can switch the micro off completely. When you begin a new session type *KEEP ON before entering *View* and the Keeper will check on the disc first to see if the kept files are present. If so it will load the context files for the language and start up *View* exactly as you left it last time you used it.

If you specify *KEEP RAM rather than ON, the language contexts will be preserved in the Master 128's spare sideways RAM areas. This holds contexts from two *View* family languages at once (meaning that you can work on three at a time). Any further langauge will then be stored in disc as before. This method is very quick to use – almost instantaneous in fact – while swapping from one language to another using disc alone takes about 17 seconds with the ADFS. There are a couple of points to watch for with the Keeper. If you are leaving *ViewSheet*, you should save any

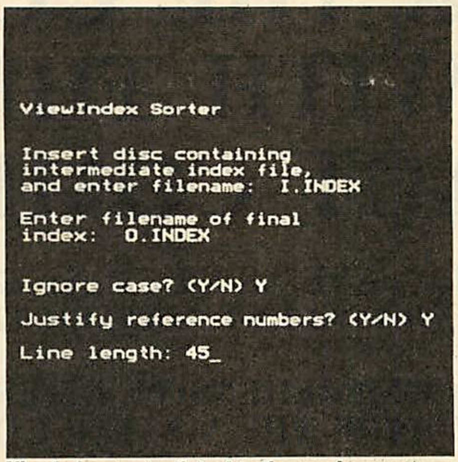
printer windows first using the SW command, as these are not preserved by the Keeper routine. Also, if you use the RAM option with this command there is no protection for any ROM images that are already loaded into the sideways RAM area, and these may be overwritten without warning. But the *KEEP command really does make light work of passing information between the various members of the *View* family. There's also a limitation on the context files – your *View* text cannot be longer than 30k, so very long documents on a Master Turbo may be too long to preserve in this way.

Extensions to ViewSheet

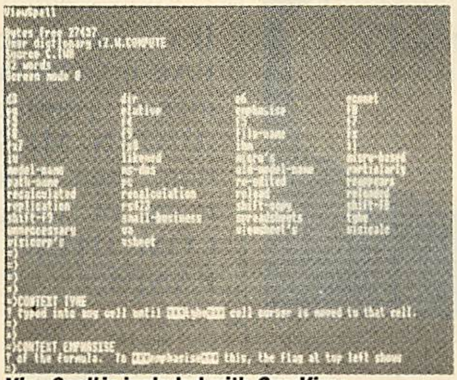
*READ is another useful command in an integrated system, allowing the contents of an ASCII file to be read into *ViewSheet* at a specified location. Data in the form of numbers or words can be incorporated into spreadsheets from other sources, including the other *View* programs. For example, *READ TABLE A1 would read in the contents of a spooled file called TABLE, placing each separate item in a new slot starting at A1, and moving down to a new row whenever it sees a carriage return. The command usually interprets a group of spaces as the signal to move on to a new slot, so any spaces in continuous text should be deleted and added to the sheet later. Alternatively the spaces could be replaced with another character such as an underline before running the command – this is easily done in *View*. Tab characters can be specified as the separator between items if required, so if the file to be read in contains Tabs, such as the field separators in a *ViewStore* database, then the *READ command can be altered accordingly by the addition of the letter 'T' at the end of the command, eg:

*READ TABLE A1 T

The new *RC command does the opposite of the *ViewSheet*'s PC command. It enables *ViewSheet* to read a list of slot contents from one sheet into another, as if they had been typed in, and effectively allows the merging of two or more spreadsheets. If you have a spreadsheet that you wish to incorporate in a second sheet, you can prepare a version of the spreadsheet so that its slot references correspond to gaps on the second. A list of the desired slot contents is obtained from this source sheet by turning off the printer (using the command *FX 5,0), opening a *SPOOL file to hold the information, then using the PC command to 'print the contents' of the first sheet. The *SPOOL file is then closed, and the second sheet loaded in. The *RC command can then read the contents of the file and enter them on the new sheet, slot by slot. The printer should be re-activated at some stage using *FX 5,1 for a parallel printer, or *FX 5,2 for a serial one.



***ViewIndex* can be linked to the wordprocessor**


ViewSpell* is included with *OverView

THE VIEW FAMILY

View – The wordprocessor. Now in its third major revision, *View* remains probably the most powerful wordprocessor for the BBC micro. Later versions are much improved on the original. Although not simple to use, it contains all the features for producing professional looking documents. Reviewed June 1983.

ViewSheet The spreadsheet. A powerful spreadsheet now bundled with the Master 128. Reviewed February 1985.

ViewStore – The database manager. Not simple to use, and can't be 'programmed' to tailor it to your own application like Minerva's *DeltaBase*, but still the first choice for most users.

ViewSpell – The spelling checker. A useful adjunct to *View*, but Computer Concept's *SpellMaster* has the edge. Reviewed July 1987.

ViewPlot – The graph generator. Uses *ViewSheet* files to produce graphs and tables. *Acorn User* produces its own version, *ViewChart*.

ViewIndex – The automatic indexer. Vital for authors of technical works.

View PDG – Creates printer drivers for the other applications.

Compact OverView

OverView is available as a cartridge for use on the Master 128, but now it's also on a single 3.5-inch ADFS disc for the Master Compact. This disc version also includes *ViewSheet*, which is already bundled with the Master 128. So whichever Acorn machine you have, *OverView* offers to complete the *View* family.

OverView also forms part of the 'Compact Professional' package, available from most Acorn dealers. This is a Master Compact, plus *OverView* and a Brother HR-20 daisy-wheel printer. The combination price is £746 with a mono monitor, £919 with colour; separately the items would cost £1091 or £1264.

Conclusions

I have not attempted to talk about the main products combined within *OverView*, (*ViewStore*, *ViewSpell*, *ViewPlot*, *ViewIndex* and the printer driver generator) as these have already been reviewed at length in *Acorn User*. The beauty of *OverView* is that it supplies all these, and more, in one convenient package. With a price of under £100, it represents good value for money for anyone who wants to use the *View* software seriously. Admittedly the *View* family applications themselves are not particularly easy to use by current standards, but they are extremely versatile, and hence are capable of carrying out an enormous range of business tasks. *View 3*, as fitted to the Master, is a great improvement on the previous versions, and provides a solid base for the degree of integration made possible by *OverView*. The new commands supplied in the *OverView* cartridge are very useful indeed, and I would like to see them issued in an 8k ROM for users of the good old model B. In the meantime, the *OverView* package certainly offers BBC model B *View* users a good reason to upgrade to the Master or Compact, if they haven't done so already!

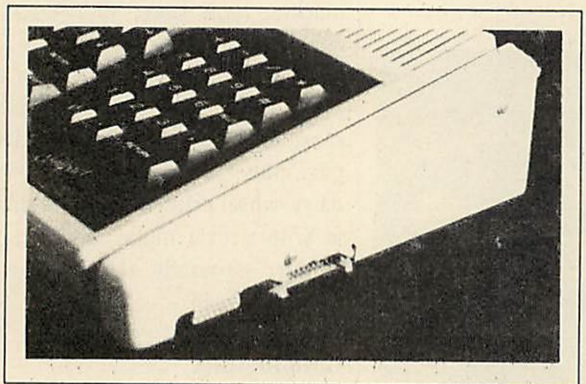
OverView *for the Master 128 (cartridge plus 5.25-inch disc) costs £98.90.* OverView *for the Compact (3.5-inch disc) costs £99.95.*

Clive Williamson is the author of Mastering View, ViewSheet and ViewStore (*Sigma Press, £12.95*).

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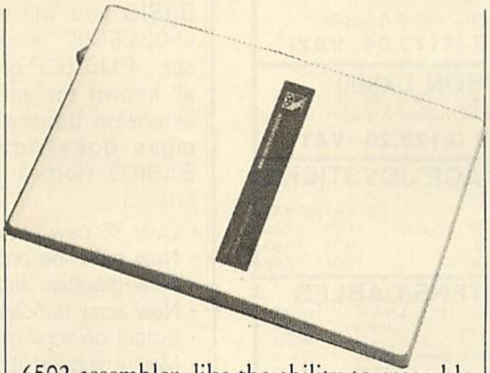
Advanced Basic is not a contradiction in terms, but an extension to the language many programmers will find a boon. Graham Bell tries it out

Fancy an Archimedes but can't afford it? Obviously your old BBC micro can't hope to emulate either the speed or the graphics abilities of the Arc, but what about some of the improvements Acorn has made to BBC Basic? A lot of people wonder why Acorn has not produced an upgraded Basic for the standard BBC.

Tubelink, however, has released Advanced Basic, formerly known as 'Archie Basic', to fill this gap. This allows you to use many of the new features of the Arc's Basic 5 on your BBC micro – providing you have a 6502 second processor, PMS second processor or Master Turbo. There's a separate Electron version for the PMS E2P second processor.

In the Advanced Basic package is a ROM containing the software, plus a disc with both the latest version of Hi-Basic (1987) and a ROM image of the Advanced Basic ROM. There's also a manual describing all the new features of Basic 5 and the differences between the Archimedes version and this one. Installation is easy, once you've decided which way you want to do it, and the options are well described in the manual. Both Hi-Basic and Advanced Basic can be put in sideways RAM, or Advanced Basic alone can be installed, as a ROM or sideways RAM image, and Hi-Basic can be run from disc. *ABASIC starts up the new language.

So what does it give you? It amounts to a new version of Basic, similar though not identical to Basic 5. Structures like WHILE, CASE and multi-line IF statements are all there, together with conveniences like OFF to switch off the cursor, APPEND to join programs together, and ORIGIN to set the graphics origin. These all make for clearer and faster programming. And with a Master 128, or if you have *GXR*, the extended graphics commands like CIRCLE and FILL are there. Some of the Archimedes SYS calls are implemented too – by translating them into their BBC operating system equivalents. So SYS OS_Byte is the equivalent of CALL &FFF4. Although the ARM assembler is missing, there are useful additions to the



6502 assembler, like the ability to assemble to disc or sideways RAM.

The commands that help deal with Archimedes hardware are, of course, not provided – no TINT, TEMPO or BEATS, or the higher resolution modes of the Arc. These are all ignored, though they don't necessarily cause any errors.

The Advanced Basic disc contains two short procedures that can be added to your programs so that you can drive your programs with an AMX or Nidd Valley mouse. Note though that the mouse's *SuperArt* or *Chauffeur* ROM must be present too. Commands like MOUSE x%,y%,b% can be used to set x% and y% to the screen position of the mouse pointer.

One of the best features of Advanced Basic is that it allows you to use the local error handling from Basic 5. You can define separate ON ERROR statements for each procedure, allowing for the sorts of problems that might occur in each one. Normally, ON ERROR cannot jump back within a procedure or loop. Local error trapping has the advantage that it doesn't lose track of structures – you can carry on in the middle of a loop:

```
 1000 DEF PROCdiv(i%,j%)
 1010 LOCAL ERROR
 1020 ON ERROR LOCAL PRI
NT "divide by zero":ENDP
ROC
 1030 PRINT i% / j%
 1040 ENDPROC
```

In use, Advanced Basic worked well; it ran several of the Archimedes programs I had written, and the manual explained clearly why the others didn't run – they relied on Arc features not duplicated in the Tubelink ROM. But there could be more example programs in the manual, showing how to use the new commands. This isn't serious, as the ROM is aimed squarely at experienced and knowledgable programmers.

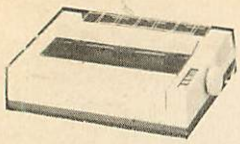
Advanced Basic does not slow an existing Basic program down. A REPEAT... UNTIL loop in pure Hi-Basic executes at the same speed as a similar WHILE... ENDWHILE loop involving Advanced Basic. But some new commands, like CIRCLE, can be slightly slower than their equivalent VDU codes, and loops involving two or more of the new commands can be slower than expected.

Interestingly, Advanced Basic uses an overlaying technique to avoid reducing the memory available for your programs too much. A small amount (4k) of new code is added to Hi-Basic from the ROM. If one of the new keywords is recognised, then this calls up the relevant section of extra code from the ROM — a very fast transfer across the Tube occurs. Another new keyword might require a different section of the ROM, so another chunk is called up, overwriting the first. Only Hi-Basic itself and a small portion of Advanced Basic controlling the overlays remains in the second processor memory all the time. This process of copying parts of the language across the Tube while a program is running accounts for the speed reductions noted above.

Advanced Basic is an intriguing product. It offers a lot, but only to the very few who already have a Master Turbo or 6502 second processor, *GXR* and possibly a mouse. And if you write programs using the new constructs, they won't run without Advanced Basic – if you want others to use your programs, Advanced Basic is not for you. But new programs are likely to run on an Arc, so it can offer a back-door approach to Archimedes programming, and its CASE statement is a boon for structuring freaks. It is a ROM for the dedicated home programmer only.

Advanced Basic costs £29.95 (BBC/Master disc only), £34.95 (BBC/Master incl. ROM) and £24.95 (Electron) from Tubelink, PO Box 641, London NW9 8TF.

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Advanced BASIC

What is Advanced BASIC? Advanced BASIC is a new version of BASIC for the BBC micro models B/B+/Master/Electron - the most powerful BASIC ever written for a 6502 based micro, enabling you to take advantage of many of the facilities offered by Acorn's BASIC V (Archimedes BASIC), along with many additional features for programmers. **Will Advanced BASIC run on my machine?** Advanced BASIC is fully compatible with the BBC micro models B, B+, B+128, Master, and Electron. To use Advanced BASIC you will require a second processor; either Acorn 6502/65C02 second processor, Turbo (65C102) co-processor, PMS B2P or PMS E2P. Advanced BASIC is suitable for all known makes of sideways RAM, shadow RAM, ROM extension boards, DFS, ADFS, and Econet. **What advantages does Advanced BASIC have over my existing BASIC?** Here are some of Advanced BASIC's exciting features...

- Over 35 new keywords
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- New error handling and TRACE debugging facilities
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- Mouse support (use new MOUSE keyword)
- Function and procedure libraries
- Acorn's fastest and most accurate 1987 Hi-BASIC included
- Extended features for assembler programmers
- Comprehensive 56pp user guide
- Programming utilities and file transfer software
- Keyword and token-compatible with Acorn BASIC V
- Programs will run on Archimedes without modification

What do the magazines say about Advanced BASIC? *"Once you've started using Advanced BASIC you won't want to go back to the old one... I thoroughly recommend it as a valuable programming tool."* Micro User (January 1988) *"Using Advanced BASIC is most addictive - all those extra commands and facilities enable quite complex BASIC to be written with as little fuss as possible."* BEEBUG (November 1987)

The Advanced BASIC system disc contains over 80k of code, including the very latest version of Acorn's HiBASIC under license, the Advanced BASIC ROM image, mouse drivers, example programs, and utilities. Advanced BASIC is available on 16k EPROM or disc for sideways RAM users. Both packs contain the 56pp user guide and 40/80 track system disc described above.

Advanced BASIC on 5.25" disc £29.95 • EPROM £34.95 • Advanced BASIC (Electron ROM) £24.95 (state 3.5" or 5.25" disc)

Acorn's 1987 Hi-BASIC for BBC B/B+/Master Available under license from Acorn, Tubelink are able to supply the very latest version of HiBASIC which offers considerable speed and accuracy improvements over the previous versions. Available on 40/80T disc or 16k EPROM. (Supplied FREE with Advanced BASIC package) • £9.95 disc • £14.95 EPROM

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SOFTWARE

TAKE A DIVE

A glider simulation may not be everyone's idea of action-packed adventure, but Simon Craven finds *Glider Pilot 2* well worth a flight

Glider Pilot 2 is an unusual flight simulation program for the BBC B, B+ or Master. Most simulation programmers seek to capture the thrills of high performance fighter aeroplanes, and at first sight the idea of a powerless craft floating around the sky at 40mph does lack a certain glamour. But if you have grown tired of flying under the suspension bridge in *Aviator,* this product could revive your jaded sense of fun.

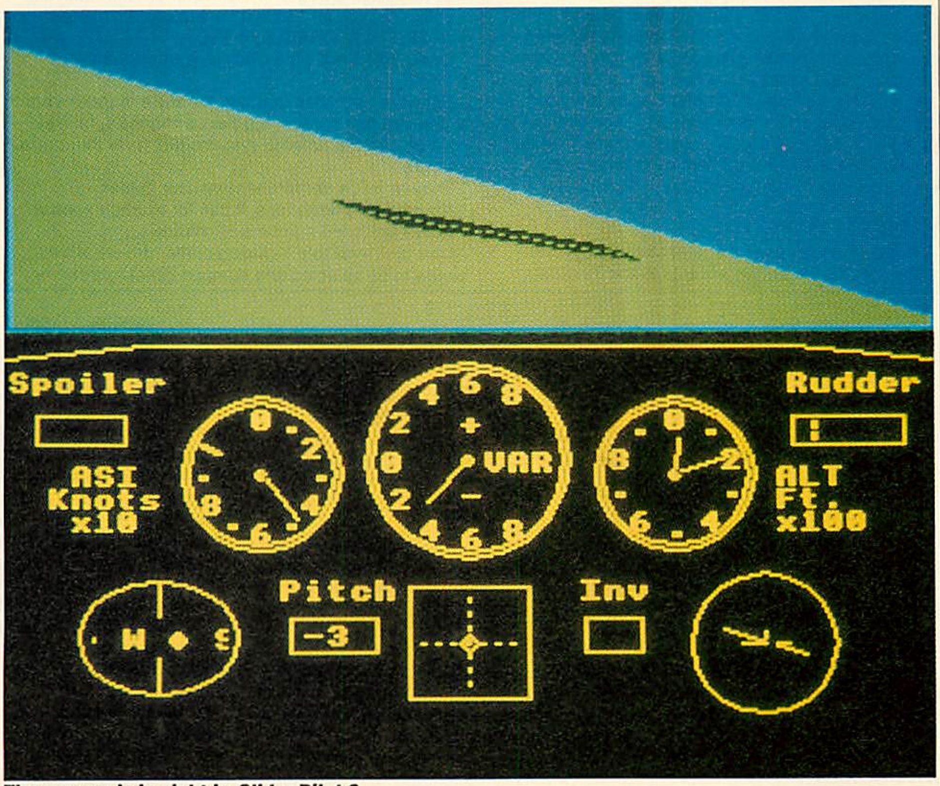
The start of each flight is a winch launch during which you must carefully monitor your angle of climb. Pull the nose up too far, too soon, and the tow hook slips off leaving you with an embarrassing lack of height, speed and ideas. Keep the nose too low and you will fail to gain the height needed to contact lift and thus prolong your flight.

Once off the line, the steady pull of gravity drags the glider inexorably earthwards, unless you manage to contact rising air. Then, with skill and a healthy measure of luck, you can gain altitude with it. Real-life glider pilots find lift in many forms, but the most common is the thermal lift which is reproduced here. As the ground heats in the sunshine, convection currents are set up, and rising warm air gives you the chance you need. This simulator has insufficient detail in the sky and ground to give the pilot the clues his real-life conterpart would use, such as the position of clouds or particular features in the terrain, but it compensates by including a digital readout of the distance in feet to the centre of the nearest thermal.

The screen display is simple. Clear instruments report on height, speed, course and rate of climb or descent, and there is an artificial horizon which comes in handy for cloud flying or when the map display is obscuring the outside view.

Ground features are limited to the home airfield and a number of beacons dotted around the imaginary world. Once you master the basics, the aim is to navigate a course around these and back to base.

The controls are equally simple – just the three primary flight controls of ailerons, elevators and rudder together with powerful spoilers which steepen the descent for accurate landings. Keyboard control is possible, but the use of an analogue joystick makes things easier and more realistic.



The runway is in sight in *Glider Pilot 2*

Much of the flying time is spent circling tightly to stay in lift, so it is easy to get disorientated. Another hazard to navigation is the effect of wind, which can carry you off at a considerable rate as you thermal upwards.

Sound effects are limited to the background roar and hiss of the airflow, which accurately changes in intensity as the speed of the glider rises and falls. The ominous hush that warns of a dangerous reduction in flying speed was, if anything, more helpful than the airspeed indicator itself, just as in many real-life gliders.

The program is obviously the product of a low-budget operation – packaging and documentation are a little crude by the standards of the major games houses – but that in no way affects the quality and realism of the simulation itself. The only major criticism I can make of the programming is that sudden changes of attitude can occasionally beat the speed of the horizon-update routine, sometimes leaving a ghostly false horizon streaking the sky.

The actual content of the documentation is very informative. A small 16-page booklet explains the fundamentals of powerless flight and covers the features of the software thoroughly. Newcomers to flying or flight simulators would still do well to indulge in a little backround reading.

Glider Pilot 2 lacks the instant gratification factor needed to endear itself to the shoot-em-up brigade, but for confirmed flight simulation fans it is an interesting alternative to the better-known products. Judged purely as a simulator its superiority to recently released *Spitfire 40* must be profoundly embarrassing to Mirrorsoft, especially given the small size of Apex Software. Real-life glider pilots will love it.

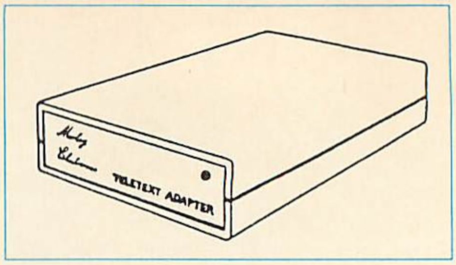
Glider Pilot 2, *Apex Software, Station Road, Pershaw, Tyne and Wear DH4 7PE. Cassette £7.95; disc £8.95.*

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* Easy to follow comprehensive user guides.
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WHAT THE REVIEWERS SAID:

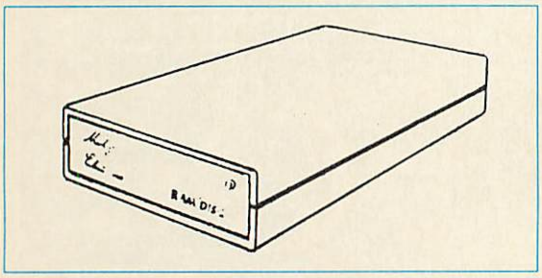
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RAMDISC

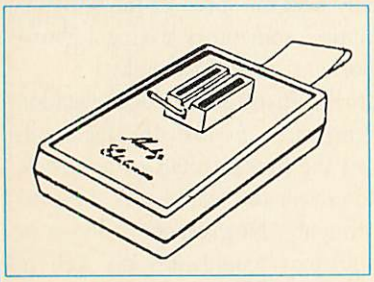


Now available! The first true MEGA capacity RAMdisc for the BBC, BBC B+ and MASTER computers. This fully compatible unit, currently available in either 1 or 2 megabyte versions comes complete with operating software on ROM, power supply, and a comprehensive user guide.

FEATURES:

One megabyte of RAM connected to the 1mHz bus. Used with the supplied ROM software programs and files may be saved and loaded from the RAMdisc in the same manner as from a floppy disc with a large increase of speed, for example, a 20k mode 0 screen takes about 3-4 seconds to load from disc and about 0.2-0.3 seconds to load from the RAMdisc. The RAMdisc ROM operates as a utility ROM working with the current filing system rather than as a separate filing system. Therefore ensures compatibility with any Acorn compatible DFS (not ADFS). The RAMdisc can be selected by a * command to take the place of any drive number from 0 to 9. If the RAMdisc replaces a floppy drive as 0 for example, all commands addressed to drive 0 will be intercepted by the RAMdisc. The default drive number is 4. Any 'Dangerous' *commands such as *COMPACT, *COPY, *BACKUP etc can be intercepted and the BBC's RAM from page 2 to &7FFF saved to RAMdisc workspace, and may be recovered using a *command. This prevents accidental corruption of any programs/data in RAM you may have been using at the time. The filing system wedge ROM supplied supports load/save, byte file access, all relevant OSFSC commands, and contains a formatter verifier and 'sector' editor for use with the RAMdisc. Catalogue structure allows up to 2,688 files.
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EPROM PROGRAMMER V2



The MORLEY EPROM PROGRAMMER V2 is a small self contained unit that plugs into the BBC or MASTER user port. It comes with a high quality ZIF (zero insertion force socket) and contrasting plastic case. Also included in the package is it's own user friendly menu driven software on ROM or disc.
This state of the art unit, allows programming of 2764 (8k), 27128 (16k), and 27256 (32k) EPROMS. Not only does the hardware allow programming of the usual NMOS devices, but will handle the new generation CMOS equally as well, and with the average time taken to program a 16k at less than 30 seconds we believe it to be one of the fastest programmers available today.

THE HARDWARE

The Unit is completely under software control, there are no knobs or switches to baffle the novice, and the extended features provided should excite the pro's.

THE SOFTWARE

The comprehensive user friendly software included in the package has two main parts, the first allows EPROMS to be read, programmed, verified and edited, also allowing a ROM image to be loaded or saved to disc. The second is a full ROM management system in its own right, which has a host of useful features and routines, such as KILL and RESURRECT ROM to disable or enable a sideways ROM, dump ROM image to buffer or disc, move ROM image in buffer to sideways RAM, and VIEW-SEARCH any sideways ROM.
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MASTER CARTRIDGE

Designed and manufactured by Care Electronics to Acorn specifications. These high quality Master expansion cartridges will take two 16k sideways ROM's, and will, unlike similar cartridges available from other manufacturers, accept the new second generation programs, such as Computer Concepts Interword and Spellmaster ROM's.
These Cartridges come in a high quality, robust, formed-plastic case, that fits neatly into either one of the Master's cartridge slots.
QUADS also available quad cartridges specifications as duels but taking 4x16k roms.

MASTER SMART CARTRIDGE

This device was designed and manufactured jointly by Morley and Care Electronics.
The **Smart** cartridge will at the press of a button halt any program running in memory and execute any one of a host of useful built in, or user defined procedures, and once completed will return to the program and continue where it left off. The only limiting factor with this device is the programmers imagination.
The **Smart** cartridge will prive useful to the novice, allowing him to do the simple things like dump any screen to printer, and make backups of protected tape or disc based software, but has an open ended specification for the advanced 'HACKER' allowing advanced programming techniques to be incorporated into almost any program at the touch of a button.

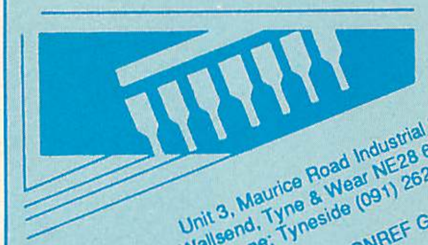
BUILT IN FEATURES (at the press of a button)

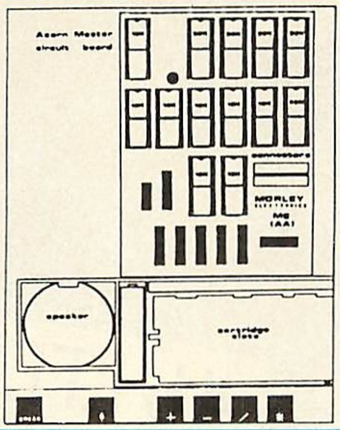
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MORLEY ELECTRONICS





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At long last the add-on all MASTER users have been waiting for, an internal ROM board.

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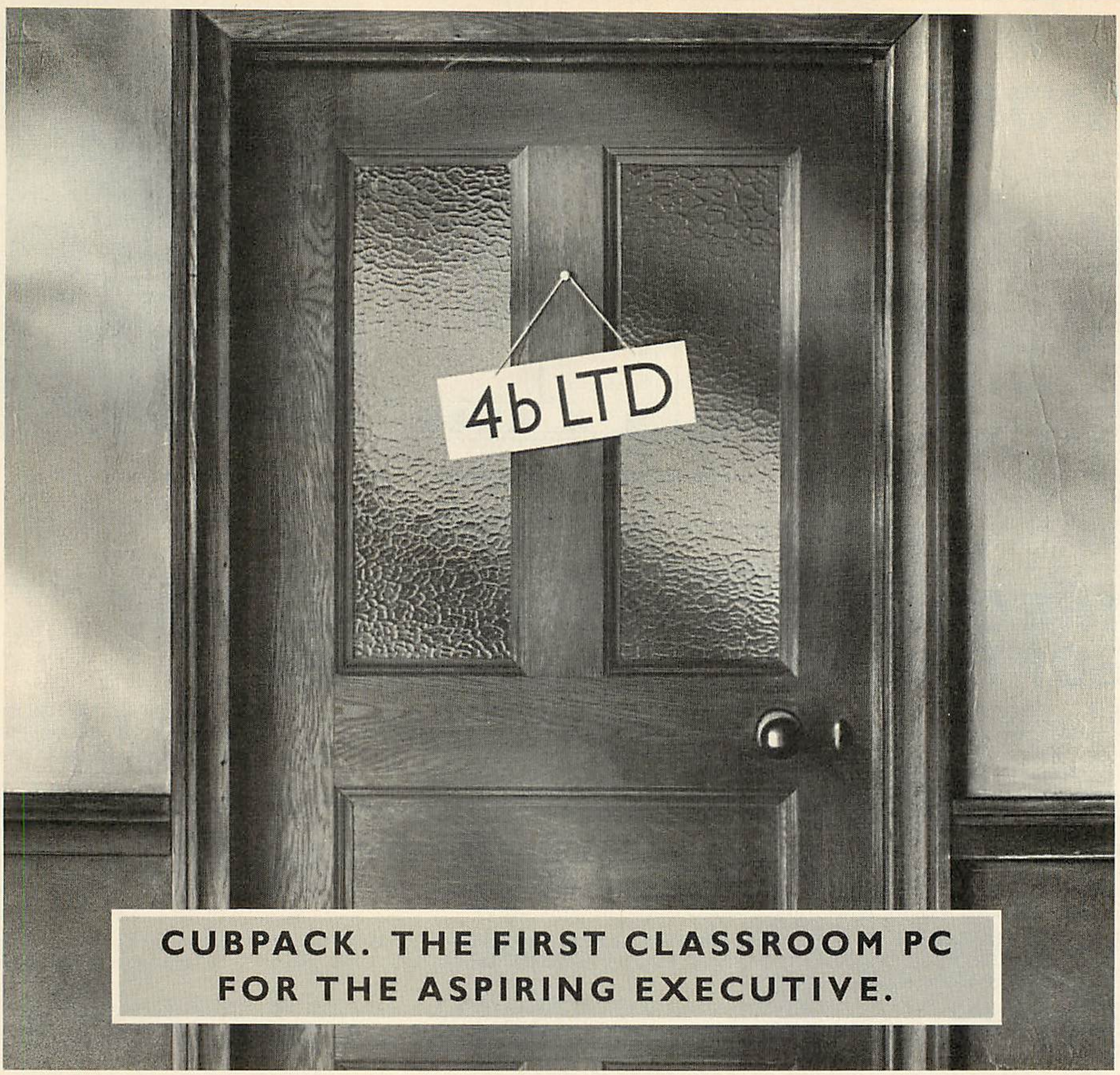
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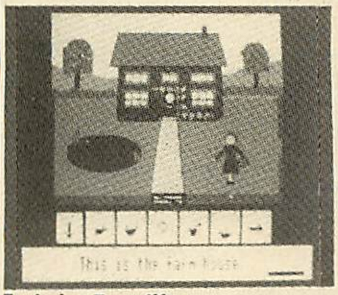
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EDUCATION

NEWS

News in brief

■ Two programs have been released by Sherston Software. *The Farm* is intended to fit into cross-curricular farming projects. It includes activities such as language stimulus, number work and vocabulary extension.



Exploring Farm life

The Nature Park Adventure looks at conservation with a liberal sprinkling of maths and language activities. Tasks include identifying plants and animals, to develop observational skills.

■ Fernleaf has released a series of logic and reasoning games for seven to 11 year-olds. *Think It Out* comprises five games. It costs £19.95.

■ Extra fonts and graphic utilities have been released for AVP Computing's *Pixel Perfect*. The three additional font packs are £9.50 each. Also available are a maths pack, including all mathematical symbols, an art pack and a printer pack for screen dumps. All of these cost £12.50.

■ The British Institute for Traffic Education Research's programs such as *Bike and Sign, Know the Code* and *Insure Your Car* may now be copied throughout a region for 12 times the software price. Several BITER programs are also available in Welsh.

Spending cuts hit software houses

Educational software publishers are increasingly anxious about the future of their industry. In a submission to the Department of Education and Science they voice their worry that the government funding which indirectly supports them will be reduced.

In the past the Department of Trade and Industry gave schools money to buy software. This increased sales and so indirectly subsidised development projects. Removal of this support will make some companies unviable and most unprofitable.



'A computer without software is like a car without petrol'

The £19 million in this year's Education Support Grant is intended to provide advisory teachers (£11m) and hardware (£8m). Future DTI software schemes look likely to be less substantial than in previously.

Many software companies have closed in the last year. Few have become bankrupt; most have just run out of development money and enthusiasm. Neil Souch of 4mation said that the company now restricted itself to developing one new package each year. He blames teachers who expect higher quality packages, thus increasing development costs.

Brian Richardson of Cambridgeshire Software House said that without government support the industry would die. 'If schools want a diversity of software it is important that a wide range of companies exist.

'Without software, a computer is like a car without petrol. Schools need a continuing programme of software development to move ahead with new stages in technology such as the Archimedes.'

Micro music editor

Music Processor is a new program designed to take the donkey work out of composition and manuscript preparation. Mid-Sussex Software produced it to help them publish music. Much of their recent output has been made with the package.

The program can handle up to eight parts. The formatting facilities follow musical conventions to improve the appearance and layout of the music before it is printed out. Transposition is made easy by reading in one file, adding instructions and creating a new file. The is useful for schools where a variety of instruments are used.

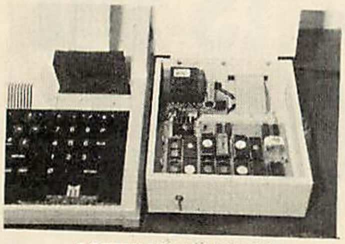
Contacts

AVP Computing, Hocker Hill House, Chepstow NP6 5ER. Tel: (02912) 5439.
BITER, Kent Street, Birmingham B5 6QF. Tel: 021-622 2402.
Fernleaf, 31 Old Road West, Gravesend. Tel: (0474) 359037.
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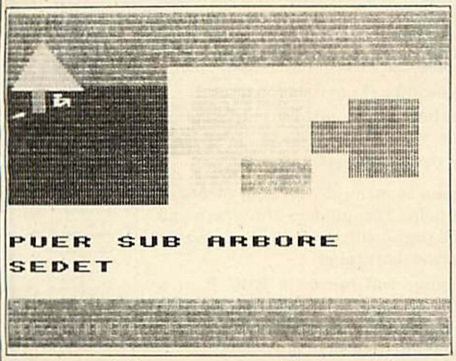
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SOFTWARE

CLASSICS UP TO DATE



Classics might seem an unlikely subject to be taught by computer with software like *Ecce Romani*. Why waste new technology on dead languages? Why, indeed, waste time teaching them in the first place?

The debate about the relevance of classics has tended to be conducted by former students with bitter memories of endless declensions of irrelevant vocabulary. But the subject has developed in this century and much excellent work by classics teachers has been ignored.

There has been a slight retreat from the once fashionable approach which discarded grammar and replaced it with culture and history. *Ecce Romani* is part of this retreat. The discs act as companions to the Longman textbook series. They are very good.

The first disc concentrates on sentence structure, vocabulary and verbs. Latin is a very precise language, and every word has its place. The opening section illustrates this with simple sentences consisting of subject, verb and prepositional phrases. Very boring, you might think, but then the graphics appear.

Puer sub arbore sedet is illustrated with a boy sitting under a tree. Press a cursor key and he stands up, the space bar and he runs around the garden, with the text amended accordingly. Press another key and a *puella* appears. A long way from the slave hastening to fetch the spear of Tiberius.

Most sections use words and concepts familiar to English teenagers, rather than alienating them with freedmen and barbarians. The motivation often lacking from classics classes is provided by the graphics.

The complexity of Latin verb formation makes machine code look simple to understand, and is the main reason why teachers have shied away from teaching Latin grammar. The various endings (which denote the subject) and stems (which denote tense) are almost infinitely configurable. On the blackboard this meant much resorting to coloured chalk and pages of tables to be copied out.

Ecce Romani has endings and stems separating from their parent verb and moving across the screen, demonstrating the thought process necessary to decipher them. It seems simple and fun rather than dull and laborious.

Sentence translation used to be the worst part of Latin classes, translating endless textbook examples. *Ecce Romani* comes into its own here. 'I understand Latin', the program announces, and invites pupils to write their own Latin sentences which it then translates back into English. The program notes admit that the translator is not infallible but it coped well with the simple sentences I threw at it.

The second disc continues with translation of longer narrative passages which are revealed word by word. The function keys contain a dictionary, although I found the command menu confusing. When a passage is completed or if you have given up, a model translation is provided. These were very literal and consequently poor English; my own equally accurate but less literal translation was brutally stamped 'wrong'.

Here the vignettes of Roman life become less modern, and a little strange, as Cornelia accompanies her mother to buy some dormice for dinner.

My main criticism is that the program is best used on a one-to-one basis. The authors recommend no more than three pupils to a computer, but really there is only room for one. Although there are often too few computers in schools to dedicate many to classics, Latin classes are usually small enough for this not to be a major problem.

For technophobe Latinists the program notes are a simple to understand, providing a reference version of the menus and commands so there is no problem knowing what to press next. Whether a computer program can perform classics' traditional function of civilising the uncivilised remains to be seen.

Carol Atack

MEANINGLESS QUEST

'You are the Blue Knight, you are visible and aroused' says AUCBE's *Knights of Camelot* adventure. It was written using their adventure generator – both are bundled in with *Quest Adventure*.

The message makes little sense – an air of confusion is carried right through this package. Problems begin straight away – you need four different discs to get started, though this soon narrows down to two for most of the time.

The package has, at first sight, so much to recommend it. I can see the difference between actors, scenes and props is a very good way of helping children understand adventures. I can enthuse about the advantages of using a database to build up the long lists of objects, room descriptions and so on that an adventure requires. The adventure creator files are straightforward, avoiding the complex codes that are used in utilities such as Incentive's *Graphic Adventure Creator*, and an exciting feature is the facility to have several children playing different characters in the same adventure.

However, it seems the adventure program is inconsistent in dealing with the data files. In *Knights of Camelot*, the object is to find the Holy Grail. Children playing the game have discovered that often they start the game already carrying it, or find it in the very next room. In fact, the game will often start you in a location from which there seems no escape.

The value of the program may lie in children creating adventures, not in playing them. But surely they must be able to produce a game that can be appreciated by other children. Because of problems with the adventure playing part of the package, the chance of disappointment is huge.

There will be teachers who make good use of this package, but, the inconsistencies and practical problems of playing less than well-constructed adventures will discourage most.

Marshal Anderson

Ecce Romani *costs £22.43 from Longman Micro Software, 62 Hallfield Road, York.* Quest Adventure *costs £25 from AUCBE, Endymion Road, Hatfield, Herts.*

EDUCATION

PLEASE DO TOUCH

More and more pieces of software use Microvitec's Touchscreen to make them easier to use for children, but how good are they?

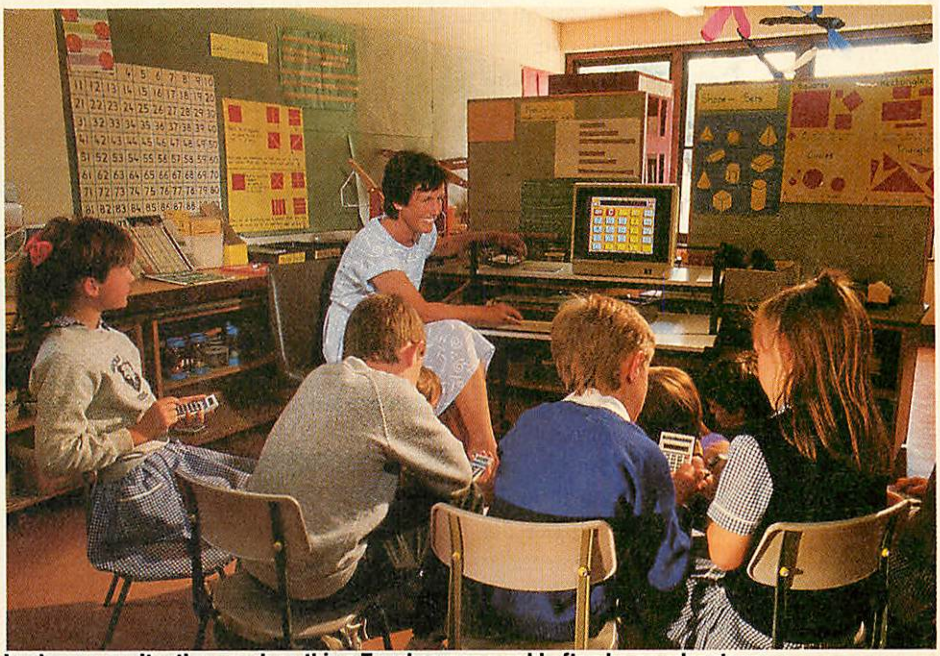
Chris Drage and Nick Evans

In the November 1986 issue of *Acorn User*, we reviewed the Microvitec Touchtech 501 Touchscreen. After trialling the device at a special school in west London, we concluded that the Touchtech 501 was an ideal device for children with special needs, as it exploits children's natural tendency to point to and touch the image displayed on the monitor. But our experience with the Touchscreen also suggested that consideration must be given to the motor skills required to touch the screen and careful thought must go into positioning the child and the monitor.

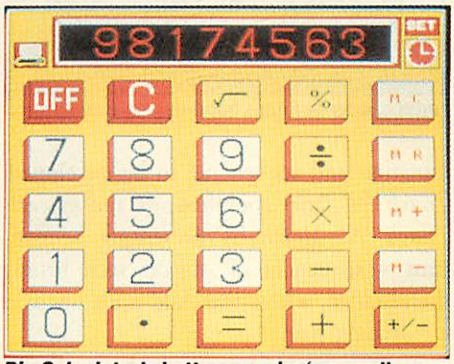
In the review we noted that good software for the device was in short supply. But now there are at least 160 packages offering Touchtech support. So it seems appropriate to look again at the range of Touchtech software currently available in special education. This is an important and growing area of computing.

The four publishers we're focusing on are Brilliant Computing, Arrow Marketing, the Research Centre for Education of the Visually Handicapped (RCEVH) at the University of Birmingham, and Micromate Software which is available from Toys for the Handicapped. Each produces well designed software, but their products are not unique. The latest catalogue of software for the Touchtech 501 is available from Micovitec, and many teachers can visit a local SEMERC or LEA computing centre to evaluate other publisher's work. The regional SEMERCs have a range of free Touchscreen software, in the form of MESU 'blue file' material. Although the quality of some of it is in doubt, it does at least provide an effective software library to get teachers started with the Touchscreen system.

Brilliant Computing produces a graded range of Touchtech software to complement that for the various switch units it markets. Much of the software is enhanced from the original switch-based programs. *First Steps* provides three programs which are good for attracting a child's interest to the computer, and encouraging tracking, scanning and vocalisation – it's ideally suited for the profoundly visually handicapped. *Switch On*, developed with the aid of the Speech Therapy Department of Leeds General Infirmary, provides two further programs which can be used in a wide variety of clincal or educational situations. The large, simple graphic images used, and the sensible choice of colours, make this software ideal for encouraging language development with very young multi-ethnic children in an infant school. *Everyday Signs* tests children's ability to recognise common words on signs. It provides a useful matching activity, based on words commonly encountered in the everyday environment. The teacher can add an extra set of 16 words to meet the special needs of individuals. Brilliant Computing was quick to recognise the value of the Touchscreen for the visually disabled, and this resulted in *Touchgames 1*, a suite of six well designed programs extending the tracking, discrimination and hand-eye co-ordination tasks initially used in its previous software. Brilliant Computing offers a range of very useful software to suit the needs of children with a wide range of learning disabilities.



In classroom situations such as this a Touchscreen would often be an advantage



***Big Calculator*'s buttons can be 'pressed'**

Arrow Marketing publishes two Touchscreen packages: *Nursery Pack* and *Primary Pack*. The former is a suite of three discs containing exercises focusing on matching colours and matching shapes. *Colour Snap* and *Shape Snap* require the child to match or find the odd one out from groups of screen objects. The rewards provided by the programs are delightful, and young children enjoy these a great deal. The *Jigsaw* program provides a final task in which the skills practised through the previous programs are applied. This is essentially the same software once produced by Egabeva software for the Concept Keyboard, but has now been rewritten for the Touchtech 501.

The *Primary Pack* provides three discs of activities to exercise visual perception and reading skills. The best of the three is *Look*

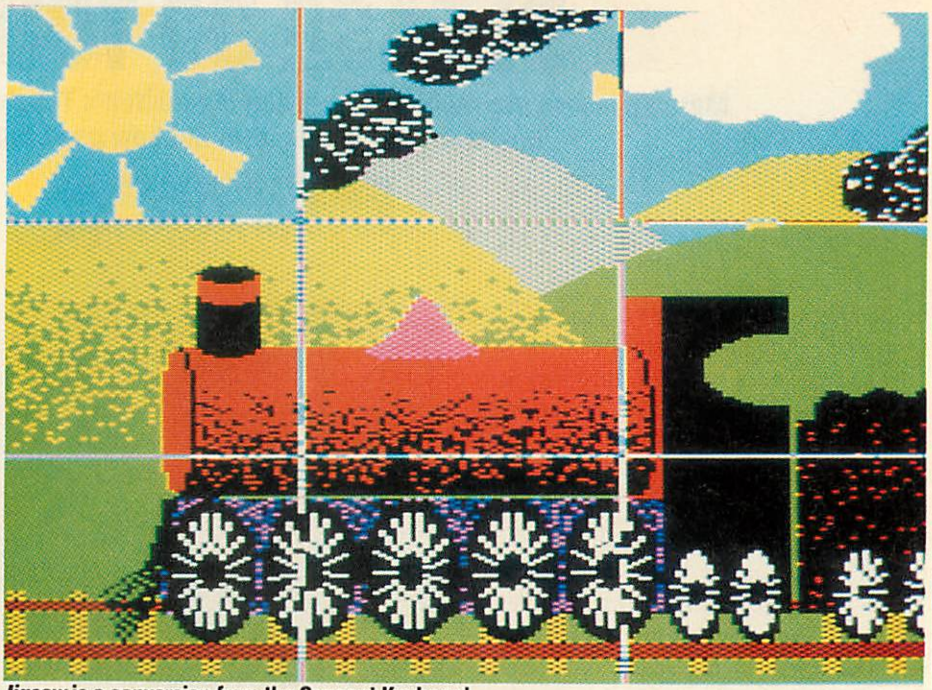
Alive – based on the familiar 'beetle' game, it is designed to practise perception of similarity. *Pick-a-Word* suffers from bad selection of screen colours, although its basic concept is very sound. *Sliding Block Puzzle* is another familiar ex-Egabeva Concept Keyboard program and is included to provide an activity to consolidate the work of the previous two programs. Arrow Marketing needs to pay more attention to providing greater teacher control over features like sound, screen colours, the number of problems, and number of attempts allowed at each. *Nursery Pack* is the better of the two, and can be recommended.

Over the past three years the RCEVH has produced and refined 17 excellent programs for individuals with multiple handicaps and who have a wide spectrum of learning difficulties. Its software has been produced to complement existing teaching material in the areas of matching, discrimination and visual memory.

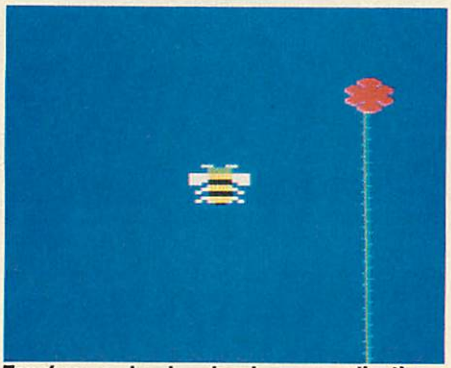
Such is the quality of the design and concept behind this suite, it is worth looking at the software in some detail. For the multi-handicapped or developmentally young, the *Just Touch* and *Touch It* two-disc pack provides a number of programs allowing a child to touch the screen and see what happens. The intention is that the child sits in front of the Touchscreen and the teacher or helper operates the conventional keyboard. It is open-ended software, and it can be used for play activities, exercises in targeting accuracy, or in demonstrating cause and effect. The *Directions* disc extends this preliminary work by enabling children to practise using the four basic directions. Again the teacher should be controlling the micro with the keyboard, the child at the Touchscreen.

The software consists of several *Which/Match* packs. They are ideally suited to the less able visually-impaired children, particulary those in primary education. The exercises begin with 12 basic shapes which vary in colour and size, in *Which One/Match One*. The later programs develop the theme and include exercises concerned with matching groups of letters or words. Far more sophisticated shapes can be designed and used with the *Which Block/Match Block* suite.

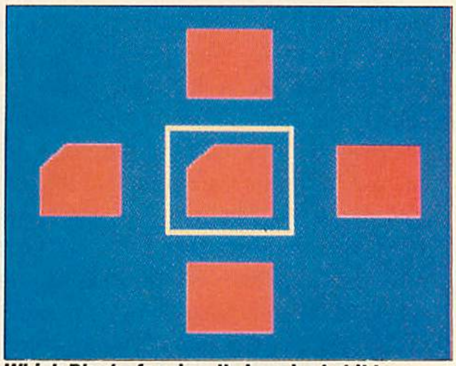
Following on from the *Which/Match* series is a group of programs collectively called *Touch 'N'*... These programs are designed for the less able, multiply disabled or young children with some sight. *Touch 'N' Match* allows more interesting variations on the themes of matching discrimination and sequencing to be developed. *Touch 'N' Pairs* complements and extends *Touch 'N' Match* by presenting pelmanisms – sequences of objects seen briefly then hidden, where the child must uncover a matching pair.



Jigsaw **is a conversion from the Concept Keyboard**



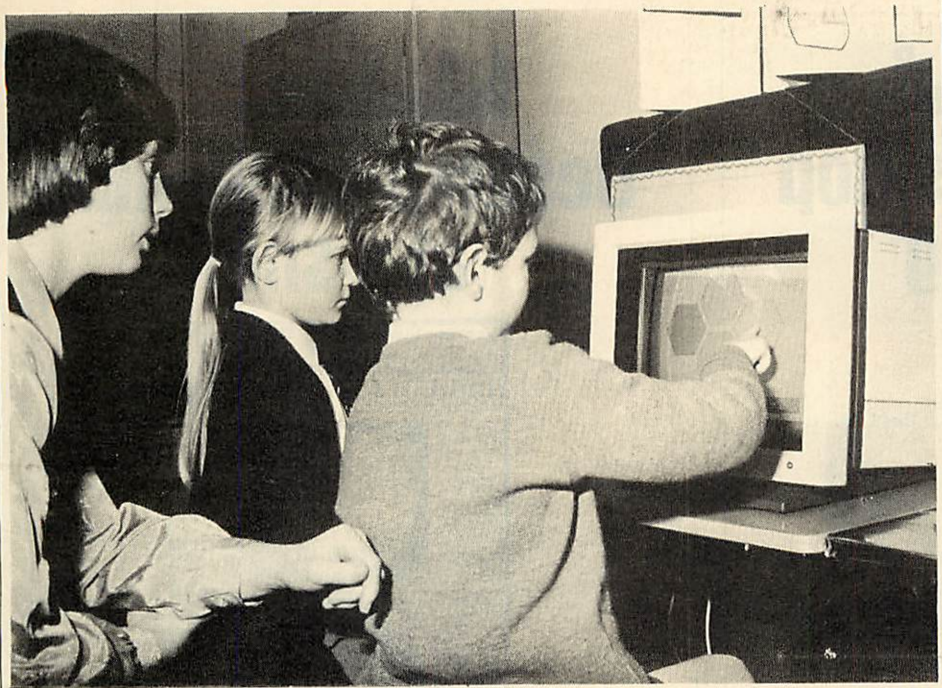
Touchgames **develops hand-eye co-ordination**



Which Block **: for visually impaired children**

What is most impressive about all this RCEVH software is the robust, almost foolproof, nature of the programming, and the degree of control the teacher or therapist has over the workings of each program. Colours, shapes, sound volume, the spacing, size and relative position of images, and whether the first image is held or not (for exercising visual memory) can all be determined externally. Each program can be extensively tailored for each particular individual, and the settings automatically saved to disc. A wide range of alternative input devices is catered for, to suit children with virtually any degree of disability. In addition, teachers can design their own examples for use with each program. RCEVH states that the examples used on each disc show the variety of work that can be done with the software, but those teaching children with very severe learning disabilities may also need to design a more structured system. This 'individualistic' approach offered by the software is vitally important, particularly in the special education sector.

Micromate is an integrated system of hardware and software developed from research work in schools. It aims to teach children basic skills and concepts, by providing access to a range of entertaining computer-based games and teaching programs. There are five discs of software, essentially Touchscreen versions of the older *Micromate* switchbox software. Typically, each disc comprises three or four programs. A much-heralded feature of *Micromate* programs is the 'performance contoured programming' technique. Put simply this means the computer matches the difficulty of the program to the user's ability. This is achieved by checking over the previous few responses, and deciding whether performance is above or below

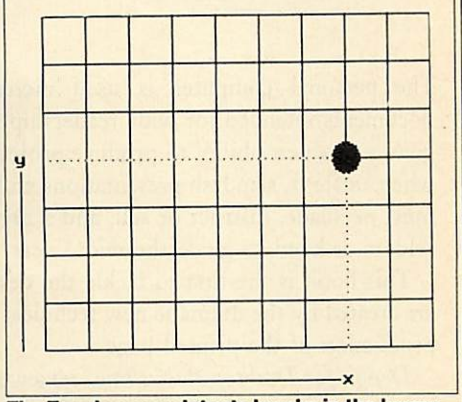


Being able to point at the screen helps children use the micro

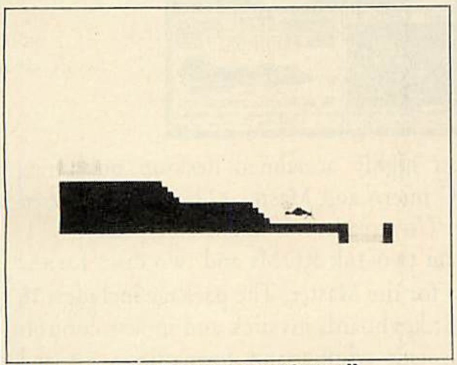
HOW THE TOUCHSCREEN WORKS

Devices such as the Microvitec Touchtech 501 enable the computer to find out when a finger is pointed at the screen.

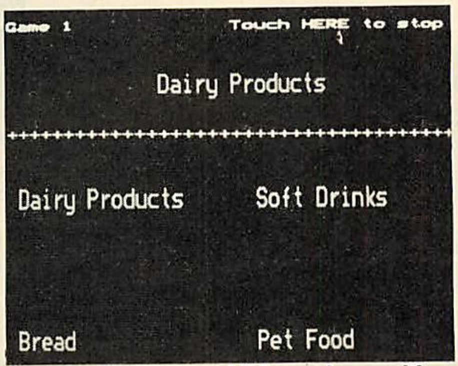
The Touchscreen projects a grid of infra-red beams horizontally and vertically across the face of the monitor. When the screen is touched with a finger or pencil as shown in the diagram below, two of the beams are broken. Opposite the beams are photocells which can detect which beams are broken. By noting which horizontal beam and which vertical beam is cut by the object, the Touchscreen can work out the part of the screen being pointed to. It then transmits the co-ordinates of the point to the computer via the serial port. The computer reads the location and can use it to control the program – just as with a mouse.



The Touchscreen detects breaks in the beams



***Micromate*: 'performance contoured'**



***Everyday Signs* tests a child's word recognition**

that expected – if it's better, then make things harder, otherwise reduce the difficulty level.

Despite being very game oriented, the *Micromate* programs have a wide range of applications. They may be used to teach a number of simple concepts – for instance, *Space Wars* and *Grand Prix* may be used to improve hand-eye co-ordination and reaction times, *Activity Program* to encourage listening and manipulation skills, and *Little and Large* and *Odd Man Out* to test visual perception. The *Micromate* range complements the RCEVH software very well, and anyone considering purchasing the latter should look seriously at *Micromate* too. It provides children with a different approach – one which many will find both stimulating and enjoyable.

An increasing number of the major educational software publishers are providing a Touchscreen option for their software as a matter of routine. Among the latest software for mainstream education is a gem from 4Mation Educational Resources: *The Big Calculator.* Mike Matson's adventure programs have become familiar over the years, but this appears to be a dramatic departure. Touching the on-screen keys is such a natural means of operating the calculator that this program is absolutely invaluable for demonstrating calculator use to groups of young children. The ability to design enlarged, simplified calculator screens for younger children who would have difficulty in using the small keys of a 'standard' calculator, and then being able to 'press' those keys opens up calculator use to the youngest children.

Touchtech 501, Microvitec PLC, Futures Way, Bolling Road, Bradford, West Yorkshire DB4 7TU. Hardware-compatible with metal-cased Microvitec monitors, software-compatible with BBC B, B+ and Master 128. Price: £241.50.

Blue File software is available to teachers from MESU, regional SEMERCs and LEAs if you send blank formatted discs. Sometimes a nominal charge is made.

Switch on, Everyday Signs, Touchscreen Games. *Brilliant Computing, PO Box 142, Bradford BD3 0JN, on disc for the BBC B, B+ and Master 128, prices: £13.35, £13.35 and £15.00 respectively.*

Nursery Pack *and* Primary Pack, *Arrow Marketing, 28 Backwell Hill Road, Bristol BS19 3PL, for the BBC B+ and Master 128. Price: £10.50 per pack.*

RCEVH software from Research Centre for the Education of the Visually Handicapped, Faculty Of Education, Department of Special Education, Selly Wick House, 59 Selly Wick Road, Birmingham B29 7JE. Price: £5.00 per program for BBC B, B+ and Master 128.

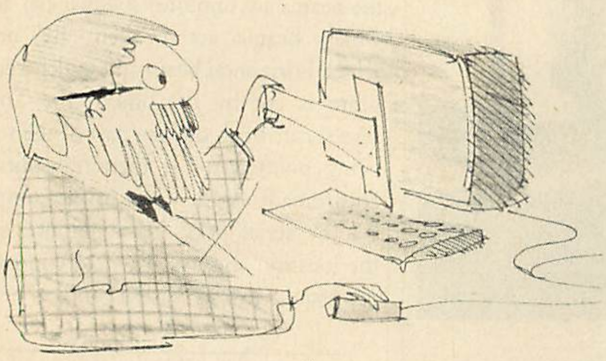
Micromate *Software for BBC B, B+ and master 128 from Toys For The Handicapped, 76 Barracks Road, Sandy Lane Industrial Estate, Stourport-on-Severn, Worcestershire DY13 9QB. Starter pack £15.00, packs 2-5 £30.00 each on disc.*

The Big Calculator, *4Mation, Linden Lea, Rock Park, Barnstaple, Devon EX32 9AQ. Price: £16.10 on disc for BBC B, B+, Master 128 and Compact.*

DTP MANUAL

AU OFFER

Design for Desktop Publishing



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The author, John Miles, is a professional designer who has used the techniques of desktop publishing he describes to produce the book itself.

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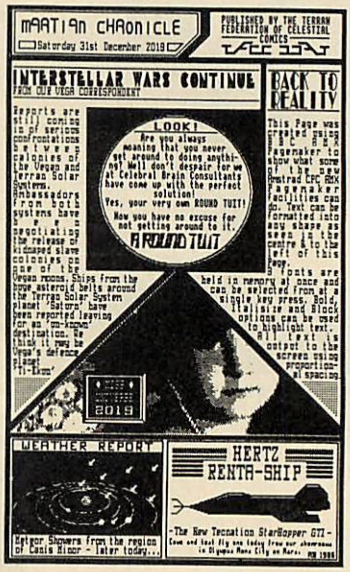
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BUSINESS

FROM BIKERS TO BANKERS

Acorn micro owners use their machines in imaginative and original ways

Roger Carus

After each issue where one of these articles appears I enjoy a busy time with letters about all kinds of uses and ideas for your micros. Some re-invent the wheel, but one recent one showed how to keep a record of them turning!

Seamus Shortall, who works for Rank Xerox in Dublin, wrote to me about the way he maintains competitor's records in the Nissan International Classic cycle race. The scale of what is done with a BBC micro is really most impressive.

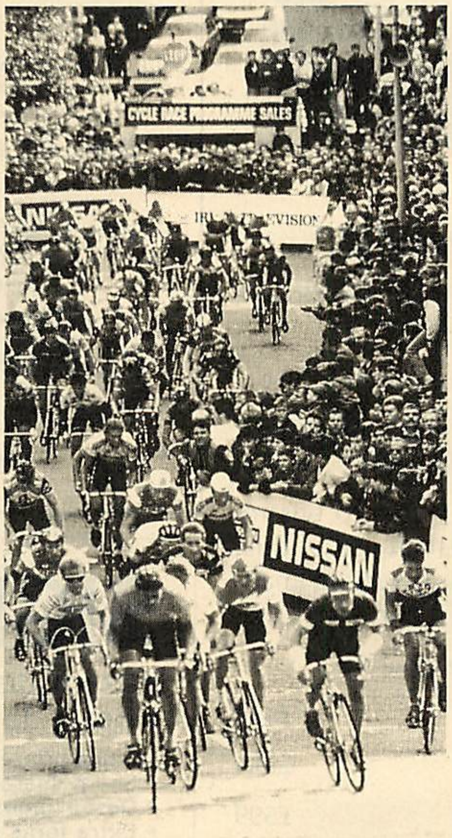
In 1987, 87 riders started the five day race which took them from Dublin to Waterford, then Kilarney, Tralee, Limerick, Kilkenny and back to the capital. For each of the five stages the times had to be recorded, and totalled to produce a 'general classification', with the final winner being the rider with the lowest total time.

To make things more interesting, as Seamus says, and to confuse me, points and bonuses were awarded at some special stages to reward the fastest sprinters and hill climbers. The program also calculated the prize money for each competitor, taken from the £25,000 which the sponsor, car manufacturer Nissan, provided.

Each day, a progress report giving the current race position had to be produced very quickly. Five hundred sets were made using a Xerox 4945 laser printer; and exceptionally good copies they are.

For the technically minded, the main program is written in Basic and runs on a BBC Master Turbo. There are also 20 machine code overlay modules, in all occupying about 500k of disc space. *View* is used to type in text as necessary to drive the program.

It is impressive that such a large and sophisticated task with tight time limits can be performed with the BBC Master. How many other sporting events could the system be adapted to cover? I know of one much smaller and simpler orienteering event which is recorded in a similar way.



Bicycle races: Records on a Beeb

One problem with orienteering is that competitors tend to arrive very fast at the finish – and there is a difficulty in typing in their times. Do readers know of any sensible automated system?

If the cycle race is an example of one of the most ambitious uses I have seen, some of the small, domestic uses are just as impressive in their own way. They certainly represent an enormous amount of personal effort.

One example came from M Fisher of Swindon who wrote his own home accounting package to monitor his bank account, but in fact it allows for 128 separate accounts, 3000 ledger entries and 100 standing orders. He could have bought a similar program, but to his credit he prefered to write his own and enjoy the satisfaction of doing so. His program doesn't lack any basic features and is an admirable piece of programming.

Several others had similar ideas, among them Shane O'Connor of Newbridge, County Kildare, who uses a spreadsheet model using *ViewSheet* to help with reconciling his bank statements, as I do myself. He has since gone on from that to make extensive use of *ViewSheet* windows on screen to make the interpretation of the summaries considerably easier.

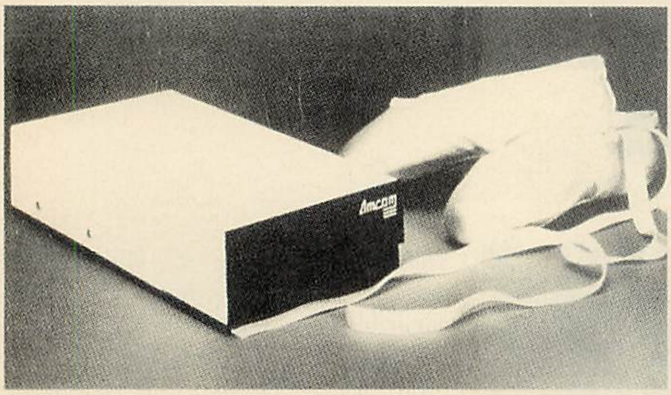
Two others writers had similar ideas. Alan Macleay of Chigwell has written a program for sale called *The Investment Analyser*. I have not seen it in operation, but it sounds promising. And the Cammells of Aylesbury have marketed a series of programs aimed at meeting the needs of individuals interested in the stockmarket. Their series covers the recording of security purchases and dividends. It can produce charts of share progress, and overall valuations of small portfolios of shares ready for the Inland Revenue to evaluate its cut of the profits.

There's one wide area of business use that I haven't yet seen covered at all in this series or in letters. I would be particularly interested to hear about and report on anyone using a BBC micro to maintain personnel recruitment and staffing records. I can find several packages for IBM equipment, but so far none for the BBC. It is certainly possible, and I am sure they exist somewhere. As ever, write in with your ideas and achievements.

IDEAS WANTED

If you have written a piece of useful software or make use of your micro for business or pleasure and would like to share your knowledge and experience, write to Roger Carus, c/o *Acorn User*, Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ.

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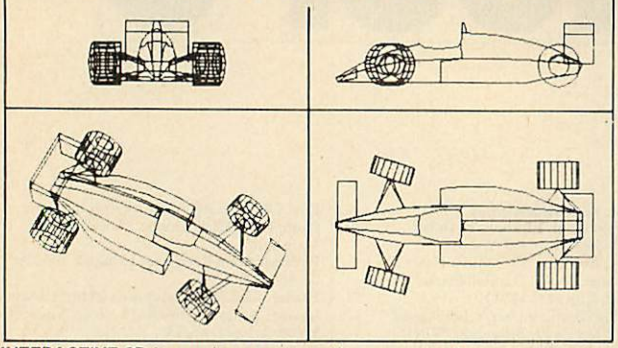
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Norway. Skandinavian BBC User Group: Frans-Otto Hendriks, Ludvig Karstensvei 14, 1064 Oslo 10
Pakistan. BBC Users Group: Capt. Z A Kidvai. Tel: Karachi 540986
South Africa. Acorn Atom Users Group: J G Dowling, 27 Oribi Avenue, Van Riebeeck Park, Kempton Park 1620
South Africa. Pretoria BBC Users Group: Stan Miller, PO Box 117, Montana 0151
South Africa. Tygerberg BBC User Group (Tygerbug): R P Donavan, 16 Bakker Street, Welgemoed, Bellville 7530
Sweden. BBC User Group: Anders Wichman, Folkungagatan 58, 11622 Stockholm
Sweden. Acorn User Society of Sweden: Tord Israelson, Tuppa Klaras Vag 12, S-702 29, Orebro, Sweden
Tasmania. BBC Users Group (Tasbeeb): Box 25 PO, North Hobart 7002

SPECIAL INTEREST

Accounts. BEEBACC: Brian Pain, 40a High Street, Stony Stratford, Milton Keynes
Tel: (0908) 564271
Atom. Acorn Atom User Club: Kevin Roll, 66 Shaldon Drive, Morden, Surrey
Tel: 01-540 5282
Bulletin Boards. Forum 80: 421 Endike Lane, Hull HU6 8AG
CP/M. CP/M User Group: Diana Fordred, 72 Mill Road, Hawley, Dartford, Kent
Tel: (0322) 22669
Disc Users. Format 40/80 Club (BBC Disc User Group): Peter Hughes, 5 Marsh Street, Bristol BS1 4AA
Econet. User Group (Scotland): c/o Michael Ryan, Balkeerie Cottage, Eassie, by Forfar, Angus
Education. Micros and Primary Education (MAPE): c/o Mrs G Jones, 76 Sudbrooke Holme Drive, Sudbrooke, Lincs LN2 2SF
Electronics. Alton Computer & Electronics Society: Kevin Weatherhead, Sheen, Old Odiham Road, Alton, Hants GU34 4BW
Tel: Alton 87478
Heraldry Society. Colin Forrester, 5 Hook Road, Epsom, Surrey KT19 8TH
Logo. British Logo Users Group (BLUG): Richard Olney, c/o London Technology Network, 86-100 St Pancras Way, London WC1
MUSE. PO Box 43, Houghton on the Hill, Leicester LE7 9GX. Tel: (0533) 433839
Radio. AMRAC (Amateur Radio and Computers): Mr T Triggel, Gleness, East Boldre, Brockenhurst, Hants SO42 7WD
Tel: (0590) 612130
RAF Personal Computer Association: Sqn Ldr J A Upham, Man S (ADP), HQ RAFSC, RAF Brampton, Huntingdon PE18 8QL
Sideways RAM user group. Send SAE: to Solinet, 13 St John St, Bridington, Yorkshire YO16 5NL

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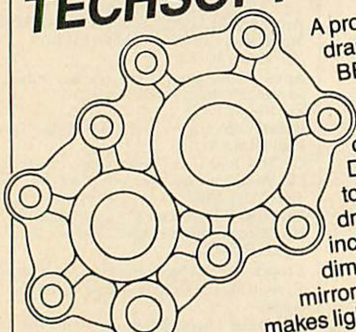
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TECHSOFT DESIGNER

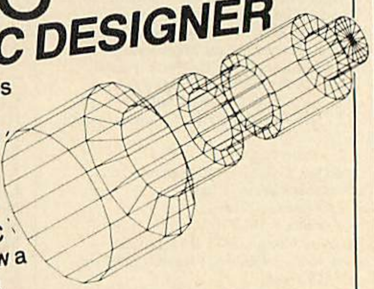


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PENPALS Electron fanatics sought to exchange tips etc and collaborate on soft/hardware projects. Carl Bateman, 86 First Avenue, Kidsgrove, Stoke-on-Trent ST7 1DW.

PENPAL wanted, lady beginner 60yrs with BBC B, swap ideas. P F Lavender, 'Browfeurig' Penryncoch, Aberystwyth, Dyfed, SY23 3ET.

PENPALS wanted to swap hints tips etc. Elk owners please. Saul Hill, 5 Hulme Road, Sale Moor, Cheshire M33 3HU.

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TURBO upgrade for Master 128 (65C 102). £70. Tel: 061-775 7004.

BBC B, Citizen 120D printer, colour monitor, 40/80T disc drive, *Wordwise Plus*, perfect condition, 40 discs. £600, will separate. Tel: (03596) 8205.

BBC B, DNFS, 800k discs, monitor, speech procesor, ATPL board, *View*, Acorn Z80 processor, software, documentation and packaging. £750. Tel: 01-671 1058.

40T D/S 5.25-inch disc drive, half height, cased with PSU suit BBC, IBM etc. £60. Tel: (0266) 42568 for details.

EVERY issue of *Acorn User* and *Micro User* (July 1982/March 1983). All bound. Offers. Tel: (0438) 359424.

WORDWISE Plus complete manuals, cassette, boxed £20. *AMX Art* ROM utils, *Paint pot* discs, manuals. £10. Tel: Ken (0782) 516610 eves.

SPELLMASTER, new, £35. *AMX Super Art* and mouse Mk3 £45. Master reference manuals 1 & 2 £18. All for Master 128. Tel: (0295) 65262.

WATFORD *Speech* £20, 12 disc games £60, 50 others £100. Two BBC ROMs £20. Acorn disc drive (40T) £30. Tel: 051-652 1862 eves.

BBC Master 512, amber hi-res. monitor DS/DD 40/80T dual disc DOS, Gem, mouse, manuals, ROMs. £700. Tel: (0334) 77617.

BBC B (Acorn DFS) wanted with disc drives and any standard Acorn add ons. Hurst, 7 Ferris Close, Bournemouth. Tel: 529787.

BBC B, DFS, 40-T disc drive, recorder, joystick, with *S-Art, MAX, ADI* ROMs plus manuals, four years *Acorn User*, complete £295. Tel: (0656) 60783.

BBC B, DFS, *Wordwise Plus*, Philips monitor, disc drive(s) matrix printer KP810, Gemini datagem, discs, manuals, as new. £950. Tel: (0433) 31350. Derby.

MODEM for Master 128 or BBC B/B+ with SW RAM, £35. Also, Odyssey bulletin board online every night (on request). Tel: (0482) 861307.

BBC B 1.2 OS, plinth, green monitor, cassette deck, Cumana graphics pad, Centronics cable, joysticks, software, books, mint condition. £350 ono. Tel: (Sevenoaks) 461525.

VIEWSTORE user guide, new. £4 post paid. Danny Langton, 13 Whitmore Close, New Southgate, London N11.

ACORN Z80 2nd processor CP/M s/w, as new. £150. Tel: (0628) 39595.

ELECTRON, Plus 1, Plus 3, PMS 2nd processor, *View*, *ViewSheet*, ADT, Hitachi green monitor, recorder, discs, tapes, manuals. £300. Tel: (0923) 224560.

BEEBUG *Masterfile II* £12. *Studio 8* £10. *AMX Super Art* (Master version) £20. *AMX Max* £10. CJE's *MFNLQ* ROM + disc 'B' £22. Tel: (0527) 32613.

WATFORD 32k card, ATPL board, Acorn 40T SS drive. 6502 2nd processor, *InterWord. Wordwise Plus, InterSheet, Masterfile, Quick calc.* Details Tel: (0284) 61605 eves.

ELECTRON, Plus 1, Plus 3, *View* £50. Discs, + box, s/w, books, everything £150. Tel: (0784) 32013. Ask for Harris, Marshall 001.

PENMAN plotter wanted in good condition. Tel: (027 875) 477, anytime, or write 'Long Beach', Warren Road, Brean, Somerset TA8 2RR.

MODEM: Watford Apollo +ROM, BT approved £70 ono. Microvitec colour monitor £95 ono. Also printer and dumpout ROMs. Tel: Philip Adey 01-785 2990 eves.

BBC OS 1.20 DFS 0.90 AMX Mouse Super ROM v3.31 *Super-Art*, Voltmace Twin 3b joystick, 100k disc drive, s/w worth £500, manuals & magazines. £800. Tel: Paul (068 45) 6334.

BBC micro 1.20 OS, excellent condition. £175. Tel: Holmfirth (0484) 684663.

ELECTRON, Plus 1, Plus 3, *View, ViewSheet* cartridges. Original s/w including database disc, games, mags. Excellent condition, £250. Tel: Reading (0734) 62687 eves.

BBC B, Acorn DFS, dual 40T drives, hi-res. monitor, Watfords ROMboard, many ROMs, books, games. Worth £1200, only £400. Tel: (0252) 703069.

BBC B OS1.2, Voltmace joysticks, *Mini Office, Revs, Match day,* Seven early learning cassette tapes. £150. Sheffield (0742) 363406 eves.

ACORNSOFT Iso-Pascal (new) £35; Comal (new) £25; Logo (new) £25; *Spellmaster* (new) £35; *Super Art* and mouse Mk3 £45. Tel: (0295) 65262.

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PRINTER Mannesmann Tally dot-matrix printer, model MT85. Epson compatible, tractor and friction feed. £220 ono. Tel: 01-952 7244.

UFD D/S 40/80T 5.25-inch disc drive, only two months use. £90. Tel: (0689) 72595 after 7 pm.

DUAL 800k, 40/80T switchable 5.25-inch drives encased in Viglen console, magazines, games, all for £150. Tel: 01-884 3114 eves.

PRINTER Seikosha GP80A. £85. Tel: Winchester (0962) 67457 after 7 pm.

BBC B, DFS 1.2, 800k D/S disc, amber monitor, AP100A printer, extensive software, cassette, joystick, comprehensive manuals. £349. Tel: David Stewart 01-943 3866.

BBC B, Acorn DFS 40/80 DS disc drive *View, MegaROM* fitted, VP101 printer. £375 o.n.o. Tel: Lee Hayes 01-861 1395 eves.

BBC B issue 7 with Acorn DFS 0.90. £225. Pace 100k disc drive. £70. ATPL ROM board +16k RAM. £28. Tel: (0204) 699470.

UNWANTED ROMs: *Visifax*. £20. *Exmon II* (no manual). £10. Also discs: *Graphito* £15, Gac £10. Interested? Tel: Andrew (0265) 825025.

BBC B series 7 APTL board, Acorn DFS, *Disc Doctor*, AMX Mouse, *Pagemaker*, Solidisk case, coiled cable dual 40/80 drives, teletext, modem. Offers. Tel: 051-722 5799.

BBC B OS 1.2 with *Wordwise, Masterfile*, BBC B calc, *Scrabble*, other games, books and manuals. £180. Tel: 01-997 3526.

BBC B Aries B32/B12 shadow/S ROM. DFS, ADFS manuals. £250. Tel: (0268) 763171 daytime only.

VOXBOX speech synthesisor for Electron still boxed. £20. First-Byte printer interface for Electron still boxed. £10. Tel: (0522) 40671.

ACORN User 1 to date. Offers. Also *Micro User*. 021-353 3498.

BBC B, Cumana dual DD, Microvitec monitor, lightpen, tape deck, joystick, *Micravet* ROM, *Wordwise, Office Master*. David (0742) 620989.

BBC B, DFS, 400k DS disc drive, recorder, speech chip, joystick interface, games, discs. (0202) 743369.

ATOM 12k, FP ROM, internal ROMboard, *Wordpak, Atomcalc*, external p/supply, books, software. £70 ono. Barry (0282) 67418.

COLOUR monitor (Microvitec) £150 hardly used, *View 2.1* with manuals, FX80 printer drivers. £35. (0753) 43636.

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BBC B OS 1.2, dual 100k drives (40T), 32k SRAM, WP, database, spreadsheet, *Pagemaker*; utilities, 60 games. £375. Derby (0332) 519823.

MASTER 128, Mitsubishi 80T DS disc drive, Two ROM cartridges, ADT ROM, manuals, floppy discs. £450. 091-417 4168 eves.

BBC B OS 1.2, 16k SRAM, games, advanced guides, excellent condition. £240. (0934) 820 952 anytime.

ELECTRON. ROMbox +, Plus 3, *View, Viewsheet, Starstore*, Elkman graphics extension S RAM, recorder, games, magazines, £195. (0362) 694994.

MICROVITEC 1431 standard res colour monitor, plastic case virtually unused, £170. 01-668 7101 (Croydon).

ACORN Z80 2nd processor including manuals and discs. As new, £300. Stewart 01-683 2875 after 7pm.

ACORN User 1 to 53, offers. 13 St Mary's Place, Lt. Dunmow, Essex CM6 3HX.

MASTER 128 manuals leads, £300. Electron, Turbo Driver, £40, Plus3, £100. 40/80 SS, £75, Rombox, £10. 1770 DFS, £10. Paul (0705) 595691 eves.

WANTED for BBC 'B'. *Foretell* share investment program, and Printmaster ROM. Tel: Brian, Blandford (0258) 53742.

WANTED urgently BBC B, + disc drive, up to £200. Tel: (0934) 511168.

WANTED Opus challenger 3/512 in mint condition. Tel: Hank (010) 4771847. (Rotterdam, The Netherlands).

WANTED Morley Teletext adapter. Tel: (0703) 262755 eves. and weekends.

WANTED. 40/80T disc drive. £30 to £35. Must be in good working order. Tel: Michael 021-552 8677.

WANTED 20Mb Winchester with appropriate software, also any bulletin board running S/W. Tel: (0924) 472994 weekends.

WANTED Epson LQ2500 printer in good condition with sheet feeder and colour option. Tel: (0745) 825036 eves. Ask for Hugo.

WANTED NLQ printer for BBC, preferably Panasonic KXP1081 or Epson, others considered. Cash waiting. Tel: Chester (0244) 672535, ask for Daran.

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Fill in the form below to a maximum of 20 words (one in each box) and send it to *Acorn User* Free Ads, 20-26 Brunswick Place, London N1 6DJ. Please use capital letters, write clearly, and remember your name, address and telephone number. Without this full information, supplied on a separate sheet of paper, we regret we cannot carry your Free Ad. We cannot accept entries selling or swapping software. This is a service to readers – no companies please. One entry per form only. Free Ads are carried in the magazine as space permits, and any Free Ads not used within a month of receipt will be disposed of.

ACORN USER'S

DIARY

Secretary goes in motto row



This offensive epigram sparked a walkout by staff at Resource

One of the nicest things about the publishing industry is the shower of goodies which rains down each Christmas. Diaries and calendars are particular favourites. While fighting over Yorkshire computing centre Resource's offering, one of those desktop calendars you tear a leaf off each passing day, ace reporter Orson Fact noticed that each day bore a little motto or epigram proffering seasonal advice.

Always in need of moral improvement, Orson flipped through the pages to learn on January 6 that 'There is no torture that a woman would not endure to enhance her beauty'. On September 6, Orson was told 'When it comes to spreading the news, the female is a lot more dependable than the mail'.

Orson rang Resource apparatchik and *AU* stringer Nick Evans. 'Have we been sexist? Oh, good,' chortled Evans delighted by the notoriety.

Orson winced as he heard several Resource calendars hurtling through the air, cries of 'Ouch', a door slamming and a secretary leaving. When Evans came round he whispered 'I've just spoken to my ex-secretary, and, er, Resource would like to apologise absolutely and unreservedly for any distress caused'.

August 15 sagely advises 'When you are in deep water, it's a good idea to keep your mouth shut'. Press officers, please note.



Vereniging van gebruikers van ACORN computers

BIG BEN CLUB

afd. Public Relations
Gommerskerspel 24
2151 RA Nieuw Vennep

Wij wensen u een Voorspoedig Nieuwjaar en hopen dat de gebruikers van Acorn-computers het komende jaar veel van hun gading in uw publicaties mogen aantreffen.

Big Ben sends greetings

Dutch user group Big Ben dazzled us with their Christmas card – gold computers printed on glossy white paper – and have followed it up with a New Year card. This has gone to mag editors over there, and they claim it translates as: 'We wish you a prosperous new year and hope Acorn users will find a lot of interesting items in your publications.'

We print it in the hope that one of our Dutch-speaking readers will write in and tell us the real meaning.

Big Ben's PR man Harry Linsen also adds that '88' is the amateur radio operator's abbreviation for 'love and kisses'. So there you go!

Wee Shona leaves

This is the cautionary tale of a young Scottish lass who made the trek south to seek fame and fortune in the big city.

At first, everything seemed to be going well for 'wee' Shona McIssac. Once the rest of the *Acorn User* crew had got used to the earrings, she settled down to the daily sub-editor's routine of gossiping and thinking up 30 puns on the word 'mouse' by lunchtime. But already there were danger signs – the trips to MacDonald's, the political meetings, the florescent green cycling leggings – and before anyone realised what was happening the city had claimed another victim.

Her behaviour became more and more erratic. Then one day she turned up for work dressed as a dog (above) and Tony Quinn was forced to call for the men in white coats. They took her away to work on *Chat* magazine. As someone said, 'How appropriate'. *Acorn User* wishes her a full recovery.

Acorn abuse in brief

■ In May 1984, *Acorn User* headlined news about a statistical package, 'Data breakthrough claimed'. Clearly the software company thought their product was quite good. The company later sent out a brochure saying 'Read what the reviewers said about. . ."Data breakthrough" (*Acorn User*)'. If it's that good, perhaps we should have reviewed it.

■ The TV programme made by the BBC about itself was enlivened by a newsreader keying into his terminal for the latest hot news. Did you see what came up? The sales figures for BBC micros! Could anyone who videoed the program send us the figures?

■ Deputy editor Steve 'Right Stuff' Mansfield has left *Acorn User*. Lack of space here means his picture will appear on next month's cover.





SEARCHING A ROOM



A DEATHMONK APPROACHES



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Leg of Toad, and Golden Fruit,
Mix with Ashes and Nightshade Root.

At the end of the thirteenth century, there lived in the land of Lorraine ten wise and powerful Magelords. Each of them had studied sorcery and enchantment from childhood days, and each knew how to evoke potent spells capable of causing metamorphosis and devastation.

You play the role of one such Magelord named Eldon The Spellbinder. Your task is to find the evil Zorn, who has deserted the Magelord brotherhood and fled to the Castle of Lorraine.

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A captivating 3D arcade-adventure full of problems to be solved by magical means. Only the appropriate ingredients mixed in the correct order will produce all the powerful spells which you need to complete your mission of destiny.

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(Compatible with the BBC B, B+ and Master Series computers).

The screen pictures show the BBC Micro version of the game.
The graphics of other versions may vary.

PRIZE COMPETITION

If you complete the Spellbinder mission (by killing the evil Zorn), you can enter our competition. Prizes include a superb engraved trophy, with Spellbinder T-shirts and signed certificates for runners-up.

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You are Bono, a friendly dragon residing in a picturesque sea-castle. As a shrewd business-dragon, keen on "nice little earners", you make your living by selling soap to the giant monsters who bathe in the sea surrounding the castle.
With the aid of your business partner, named Fozzy, you produce the soap by collecting skeletons amongst the castle caverns and then boiling the bones in a cauldron.
However, the castle caverns are fraught with danger: there are monsters who will kill you, spiders who will eat you alive, and glooks who will block your path. It will pay you dividends to also avoid the perilous trapdoors and hidden volcanoes.
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